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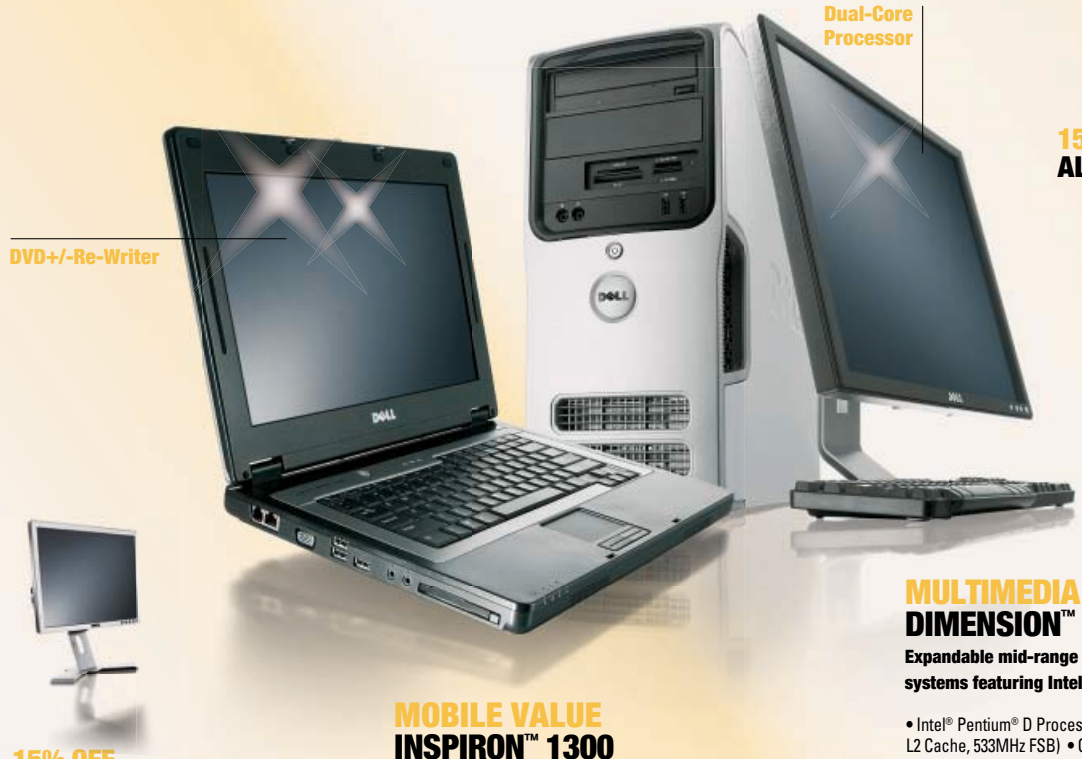

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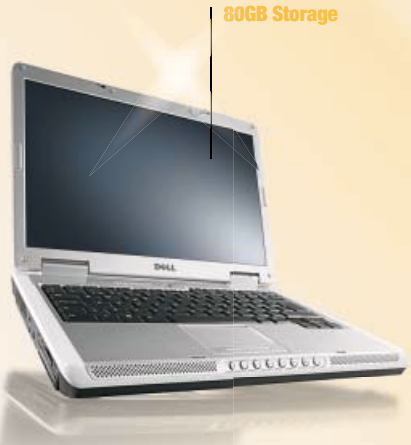

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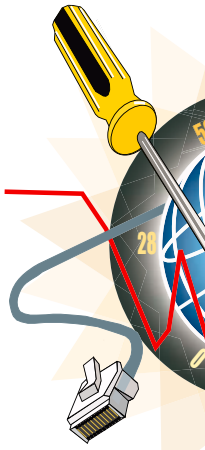

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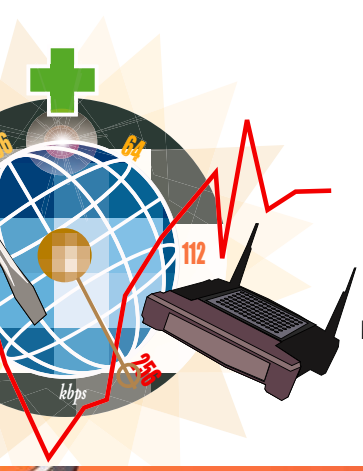

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Editorial

Has the penny finally dropped for printer manufacturers?

The 'big four' printer makers are finally cottoning on to our complaints, with great results says Dylan Armbrust

I recently attended a market briefing held by one of the 'big four' printer manufacturers, the content of which I found completely unsurprising, yet totally fascinating. It would be unfair to mention which of the big four (Canon, Lexmark, Epson and Hewlett-Packard) it was, but I can share some of the company's 'insights'.

As Powerpoint presentations go, it was pretty par for the course. Market share, units sold, models upcoming, models being phased out, and so on. However, the truly interesting information came up near the end of the presentation when our hosts began to describe consumer attitudes towards printers and printing in general.

The first observation, garnered through extensive market research, was that consumers are price-driven and that the cost of consumables (that is, inkjet cartridges) is a big issue for them. The second observation was that print quality is no longer considered important. The third observation was that printers aren't considered valuable IT items any more.

I imagine that after reading the above paragraph you're thinking those are silly things to say and that anyone with a bit of life experience could have made those 'observations' themselves. And I agree, but what I found surprising was just how surprised our friends at the printer company were at the results of their research.

'The punters are rebelling by not buying printers, or even inks, any more'

When it comes to the price of consumables, it is safe to say there are very few people out there who don't feel they are paying over the odds when they buy brand-name inkjet cartridges. Canvas any of your friends, family and colleagues and they will say the same thing: inkjet cartridges are too expensive. That's why third-party cartridge vendors and refill kit sellers do so well. No amount of advertising or industry briefing about the high cost of ink development, and the quality that comes with it, can change this perception.

From the first observation flows the second: print quality is no longer a big issue for most consumers. Gone are the days when you could tell the difference between printers – when the choice was between dot-matrix and emerging inkjet technologies, it was apparent which was better. Today, you can't really tell the difference between a photo printout on a Lexmark, Epson, Canon or HP printer unless you are a photo purist. The technology and quality have reached a point where it's no longer a sellable issue any more. As a printer manufacturer, if you can't prove that your technology is perceptibly superior to your competitors, you have a problem, because consumers don't want to pay a price premium for inks and printers that look the same as the less expensive competition.

Finally, there's the observation that printers are no longer perceived as valuable. This view shouldn't surprise anyone. With printers being given away with PCs, or being sold at essentially loss-leading prices, is it any surprise that consumers don't value them? We're all aware of the manufacturers' strategy of selling cheap printers, yet expensive cartridges, and we resent it.

The results of this research lead to one basic conclusion for all printer manufacturers, – the jig is up. No matter what they do in terms of developing new ink or printing technology, they'll never beat the perception that they've gouged consumers over the years. The punters are rebelling by not buying printers, or even inks, any more and the only way back is to lower the prices of their cartridges to a level consumers feel is fair. From what I can tell, the message is getting through, and I think we'll see some dramatic moves on cartridge pricing this Christmas season. Long may it continue. **PCW**

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Fast links to the digital home

The news this month is dominated by the emerging fast links that will be needed to realise the potential of the digital home and the first generation of truly mobile PCs.

High Speed Download Packet Access (HSDPA) services, just being rolled out, will soon face competition from Wimax. Both technologies promise multi-megabit wireless access on the move, though there remains some doubt about what you can expect in practice (see page 24).

In the home, the latest data-over-mains products look almost too good to be true: you can set up a network with a real throughput of 80Mbits/sec by plugging adapters into power sockets.

Already there is talk of fitting the technology into consumer-electronics devices such as TVs, allowing them to talk to each other and to PCs. Manufacturers even claim to have answered fears about cumulative interference (see page 14).

Two flavours of Ultra Wideband (UWB) Wireless links will soon challenge the dominance of Wifi for local untethered links. Wireless USB dongles and hubs, about to launch in the US, will allow you to get rid of the mess of leads to peripherals. But they could be slower to come to Europe (see page 25).

Consumer electronic could replace HDMI cables with data over mains

Bluetooth over UWB marries the capabilities of the smart short-range link to the speed of UWB. This technology could also be fitted to consumer electronics devices – allowing, say, a mobile media player to beam video to a TV (p25).

Microsoft's new Vista operating system, due to launch in January, could also kickstart the digital home, according to JT Wang, chairman of Acer. "There has been a lot of talk about the digital home but very little has been happening. Now we might start to see some results," he said at the company's 30th birthday celebrations in Taiwan.

Microsoft has been promising customers who buy a Windows XP PC this Christmas that they won't have to pay full price to upgrade their OS when Vista hits the shops. The upgrade is likely to cost around half the price of the full OS. PC World is offering a free Vista upgrade with any PC that costs more than £399 bought between now and March 2007.

Acer president Gianfraco Lanci said: "The OS is the only component of the PC that has not dropped in price in 20 years." *Clive Akass*

Intel flogs quad-core processors

Intel is selling its first quad-core processor, the Core 2 Quad, previously codenamed Kentsfield. The Core 2 Extreme QX6700 is a single 2.66GHz package with two Core 2 Duo processor dies. Each has 4MB of Level 2 cache giving a total of 8MB.

However, the new processor dissipates twice as many watts as its predecessor, 130W up from 65W, making it as power hungry as high-end Pentium-Ds. The front-side bus stays at 1,066MHz and the Extreme edition of the chip is unlocked to allow for the most flexible overclocking.

High-definition video editing and compression will get the biggest boost from two extra cores. Unfortunately, gamers should avoid Intel's quad-core architecture for the time being as games do not currently benefit from extra cores and several games won't even run on systems based on the processor.

Intel's new D976XBX2 motherboard is optimised for Core 2 Quad with enhancements over the current D976XBX.

Intel will sell both Core 2 Quad and Core 2 Duo ranges for some time. The QX6700 costs

Intel's new quad-core processors will boost HD video editing

$999 (£534) ex Vat when bought in quantities of 1,000 but no consumer price has been released.

See our review of Hi-grade's Ultis Tachyon QX6700 quad-core PC on page 68.

HD DVD format war revs up

The developer of a maverick high-density DVD format is planning to release a player that costs a fraction of the price of devices using the mainstream Blu-ray and HD-DVD formats.

London-based New Media Enterprises announced its Versatile Multi-layer Disc (VMD) format at Cebit earlier this year. It uses low-cost red lasers used in existing DVD players but, as its name suggests, can squeeze up to 40GB on a single disc by stacking the data at different levels.

The player, launched at the Mipcom digital-content show in Cannes, will cost about $175 (£95), which compares very favourably with the competing formats.

Samsung's BD-P1000 Blu-ray player has already debuted in the UK with a £1,000 price tag. Toshiba expects to have its HD-DVD players on the market in November and December, with the HD-E1 and HD-XE1 models costing €599 (around £400) and €899 (around £600) respectively.

The Versatile Multi-layer Disc format uses red lasers

However, New Media Enterprises' product seems unlikely to dent the market for Blu-ray and HD-DVD players, because deals have already been signed with major Hollywood and European companies to sell titles in those formats.

New Media Enterprises said at Cebit that it would initially target the Chinese and Bollywood markets – the latter, in particular, is very big in Britain. A spokeswoman for the company said that other content providers had shown interest and a deal with one German company is expected to be announced shortly. New Media Enterprises' player will be available in some European countries in December, with availability throughout Europe in January.

This is not the first time that Asian content providers have gone their own way on disc formats. The Video Compact Disc (VCD) format never took off in Europe but has been big in Asia, where it is widely used for pirated movies.

Hollywood would want to see rigid digital-rights management (DRM) in place before it allowed VMD to be used to distribute movies legitimately.

Carphone Warehouse snaps up AOL UK

Carphone Warehouse has acquired the UK internet arm of AOL in a cash sale valued at £370m. The deal will see Carphone Warehouse pay an initial charge of £250m, with the remaining £120m being paid in three instalments over the next 18 months.

Carphone Warehouse had previously launched a free broadband service for its mobile customers, called Talktalk. However, the initial rush to sign up for accounts saw the company dealing with 625,000 applications when it had only expected around 420,000.

The buyout of AOL UK includes the management and infrastructure and gives Carphone Warehouse the setup it needs to deal with the extra Talktalk customers. It also gains 1.5 million broadband and 600,000 dial-up customers, making it the UK's third largest broadband provider behind NTL and BT. AOL subscribers will be able to sign up for Talktalk free broadband or they can choose to stay with their existing service.

AOL subscribers can sign up for the free Talktalk service

AOL's parent company Time Warner put its UK, German and French internet businesses up for sale back in June. It has already sold its German unit to Telecom Italia for €675m (around £456m), giving the telecoms firm two million customers in that region.

The Carphone Warehouse deal is expected to be finalised in December 2006, following a ruling by the EU competition authority.

→ **www.carphonewarehouse.com**
→ **www.aol.com**

In brief

Apple iTunes cracked

DRM hacker DVD Jon claims to have cracked Apple's code that prevents iPod owners from playing songs downloaded from services other than iTunes.

DVD Jon, aka Jon Lech Johansen, created a company called Doubletwist Ventures to sell his technology. Monique Farantzos, managing director of Doubletwist, said Johansen had effectively reverse-engineered Apple's Fairplay DRM software, allowing other companies to offer content for the iPod.

→ **http://doubletwistventures.com**

New browser wars

Mozilla has officially launched a new version of its popular open-source web browser, Firefox 2.0.

The release came five days after Microsoft launched Internet Explorer 7, the first major standalone update to its browser in five years. Both browsers offer built-in phishing protection and IE7 has finally added tabbed browsing, which has long been a standard feature in Firefox.

Firefox 2.0 is available free for Windows, Linux and MacOS X, whereas IE7 is currently only available for Windows users.

Child abuse sites drop

The Internet Watch Foundation (IWF) has shut down more than 31,000 websites found to contain potentially illegal content in its 10 years of action.

According to its 10-year statistics, the number of child abuse websites hosted in the UK has decreased from 18 per cent in 1996 to 0.2 per cent today. The web watchdog has processed an average of 1,000 reports a month in its first 10 years. Reports have jumped from 615 in 1996 compared to almost 28,000 in 2006. The IWF tracks potential child abuse material in online photo-sharing services, message boards as well as newsgroups and websites.

→ **www.iwf.org.uk**

Macbooks double down

Apple has unveiled its first MacBook Pro laptops to feature Intel's Core 2 Duo processors. Originally launched by Intel in July, the Core 2 Duo chip bundles two processor cores on a single chip, with Intel's new power-efficient Core Microarchitecture. Apple claims the new chips will function up to 39 per cent faster than the Core Duo chips in the previous MacBooks. Prices range from $1,999 (£1,060) to $2,799 (£1,485).

Lik-Sang closes

Lik-Sang, a retailer selling Japanese and US gaming consoles in the UK, is shutting down. The High Court in London had ruled that Lik-Sang's sales of imported Sony Playstation Portable consoles was unlawful because it infringed copyright and trademarks. That decision means plans to sell the new Playstation 3 to UK customers prior to its release in Britain can not be fulfilled. The company will refund anyone who has preordered the console.

→ **www.pcw.co.uk/2167181**

Vista access causes rows

A row has broken out between rival anti-virus companies about their readiness to provide protection for Microsoft's new operating system. McAfee and Symantec have both complained that without access to the 64-bit code for Windows Vista they won't be able to develop products for it. However, rival Sophos has waded into the argument by claiming that both McAfee and Symantec should have prepared better for the launch.

→ **www.pcw.co.uk/2167115**

ATI lives on despite buyout

AMD has finalised its approximately $5.4bn (£2.85bn) buyout of graphics chip maker ATI, although the ATI brand name will not be lost in the corporate merger.

Bob Drebin, chief technology officer for the newly created PC Graphics Group at AMD, claimed ATI's project groups had not been changed or reduced since the takeover. He added that discrete graphics cards would not be phased out and that AMD will continue to carry the ATI brand name.

AMD also announced that it will be releasing a processor combining the CPU and GPU (graphics processing unit) on one die in late 2008 or early 2009. The new platform is codenamed Fusion and it aims to offer "good levels of 3D as standard", said Phil Hester, senior vice-president of AMD.

Hester said that the new CPU/GPU processors would offer a good Microsoft Vista experience as a minimum.

On his first day as an AMD employee, Drebin also announced that by 2010 AMD hopes to release a Teraflop CPU/GPU processor. He showed an example of how this would be achieved:

48 GPU pipes x 8 Flops/cycle x 3GHz = 1 Teraflop (peak performance) per socket.

A new 1 Teraflop chip may be based on the ATI Radeon

This bears some relation to the Radeon X1900 and X1950 series as they both contain 48 GPU pipes, which suggests they may be the basis for the current design.

Intel is taking a different approach to Teraflop computing. Instead of adding GPU functions, it aims to offer 80 3.1GHz cores on one die by 2010.

AMD believes the Teraflop chip will be as important as the 'Hammer' architecture released in 2003 that offered 64-bit extensions. Graphical capability will simply be another set of x86 extensions, much like the MMX and 64-bit that were bolted onto x86 processors.

Drebin admitted that the disadvantage of the new CPU/GPUs is that everyone has to pay for it. Therefore GPU functionality will be limited to keep costs down.

The combined companies have around 15,000 employees, with platform development and technical support teams located in Taipei and Shanghai, on top of AMD's existing sites in Austin and Toronto.

Data-over-mains may replace HDMI lead

Televisions and other consumer-electronics equipment going on sale next year will be network-enabled using data-over-mains modules, according to a company making chips that use the technology.

"They want to get rid of the HDMI socket and cables," said Andy Barnes, European field applications manager at Intellon.

The Intellon chips use Home Plug AV, which is the latest generation of technology from the Homeplug Powerline Alliance. The throughput is rated at 200Mbits/sec, with real data rates of up to 85Mbits/sec in each direction.

This is enough to deliver at least two high-definition data streams, which in theory could eliminate the need for a monitor data cable.

Barnes said the latest-generation Home Plug implementations were cleaner than earlier ones, reducing the risk of RF interference by 'notching out' the frequencies used by radio hams, aircraft and police.

The noise from hairdryers, microwave ovens and other appliances plugged into the mains can hit data throughput.

"Even mobile-phone adapters can cause noise. Oddly they are worse when they are left plugged in but not attached to the phone," Barnes added.

However, he went on to say its product was less susceptible to line noise than rival data-over-mains technology from Spanish company DS2.

Devolo has launched kits using the Intellon chip, with a starter pack of two costing £179.99 inc Vat. The company said the units enable users to set up a network in a minute, with no additional wiring.

Barnes said fears about the cumulative affect of RF noise from power-over-mains have not been justified. Devolo has been pushing out 250,000 units a month with no complaints.

Panasonic has its own data-over-mains technology, which it said will be implemented as standard on its consumer-electronics equipment.

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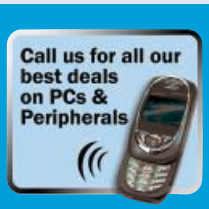

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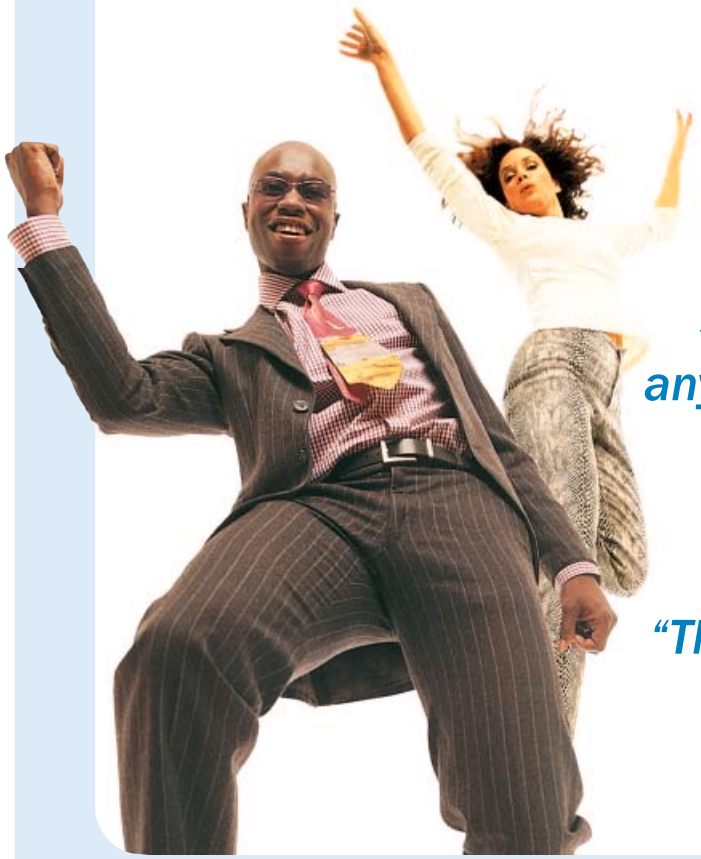

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New year's WEEE solution

Companies and individual users must be more careful how they dispose of IT equipment from 1 January, when the Waste Electrical and Electronic Equipment (WEEE) regulations come into force.

Old PCs should be sent to recycling centres or needy countries through not-for-profit organisations.

Producers and distributors of electrical materials face new rules from 1 April and manufacturers will be responsible for the cost of disposing products made after 1 July.

Britain generated about a million tonnes of waste electronics last year, said energy minister Malcolm Wicks.

Gartner principal analyst Meike Escherich accused the DTI of failing to prepare businesses for the changes. "The DTI has been so busy gazing at its navel that it forgot to tell the public this will affect them."

For a longer version of this story see **www.pcw.co.uk/2166747**.

Zigbee zaps energy waste

Zigbee short-range wireless systems are being developed to allow the lighting in old home and office buildings to be controlled remotely, with potentially enormous savings in cost and energy.

The technology is currently used mainly in mesh-networks of sensors, in places such as oil rigs, in which data and control signals hop from module to module rather than linking directly with a network backbone.

A Zigbee radio lasts for months on a button battery, or indefinitely using solar power, but has comparatively slow data rates. The better-known Bluetooth is much faster, more complex and drains a similar battery in a day.

Bob Heile, chairman of the Zigbee Alliance, said that at least three big companies are looking at Zigbee as a way of retrofitting power management into older buildings. Radio-controlled switches can be put into light and power sockets and manual switches.

The Freescale MC13192 Zigbee chip draws just 30 microamps when hibernating

"This will allow you to put in an extra light switch in an old house without the need to rewire," he said.

The cost of installing power management in big commercial buildings, where lights are commonly left on at night, could be recouped in a matter of months, he said.

Zigbee modules can also be installed in smoke alarms, Heile said. "If one of these goes off in a building there is no guarantee everyone is going to hear it. Using Zigbee, if one alarm goes off it can set them all off. It can even call the fire brigade."

Nokia has announced an even simpler technology called Wi-bree, but it appears to be restricted to control signals between very close devices. Heile said he did not know why Nokia had chosen a name so close to Zigbee.

"I'm sure it is not accidental," he said. "Zigbee has a lot of visibility."

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Via takes 'carbon free' road

Chipmaker Via has announced what it claims are the world's first 'carbon free' computer systems based around its new low-drain C7-D processor.

The label is based on the company's promise to plant enough trees to offset the carbon dioxide produced in generating the power used by the C7-D over three years. PC builders buy trees to offset the CO_2 'bill' of complete systems using the processor.

The C7-D and systems using it will carry a 'carbon free' logo – though the idea raised immediate questions about whether the claim can be completely justified.

The announcement was made on the day the Advertising Standards Authority warned companies against claiming green credentials they could not substantiate. The body ordered Scottish & Southern Energy to stop using a leaflet claiming that a similar tree-planting scheme would settle the CO_2 'bill' of homes on its 'green electricity' tariff.

Via reckons four trees will be enough to offset the C7-D's carbon use, compared with 31 trees for an Intel Pentium-D. Intel's low-powered Core architecture was not considered. Calculations were based on both systems working at full load for a certain period of time and did not take into account that the C7-D is much slower than the Pentium-D and might take longer to complete a task

An estimated 2.6 per cent of UK energy is used by computers, according to Best Foot Forward, which Via employed to do its research. But Via admits its figures do not account for CO_2 released during manufacturing.

Eighty per cent of all the energy used by a processor in its working life will have been during its manufacture, according to the United Nations University. Tranquil PC, one of the manufacturers using the C7-D, carefully labels its systems 'carbon free in use' (see box below).

Tranquil PC's David Thompson said his company put the cost of getting the badge at £1 per machine. Tranquil gives the money to Carbon Footprint, which plants the trees. The first batch has been planted in Manchester and future batches will go to Kenya.

Via has also certified systems from Evesham, which should be widely available next year.

→ **www.via.com.tw**
→ **www.evesham.co.uk**

It pays to be eco-friendly

This is Tranquil PC's latest T7 green system, which will be available shortly. Director David Thomas said the company, which specialises in robust, quiet PCs, has been pursuing a green policy since April – before Via's initiative. "We did it in response to our customers' requests," he said.

Tranquil's green PCs use low-drain Intel processors and Via models. Thomas said the system drain of a 2GHz Core 2 Duo system is about 25W. "Most of our systems draw 20 to 45W," he said.

Consumption can be as low as 10W on a solid-state system without a hard disk, which would allow them to be driven by a standard Power-over-Ethernet link.

Thomas said Tranquil offsets the carbon generated by its systems during their working life, but makes no claims about carbon audit for manufacturing the components.

But he said there are also good economic reasons to pick low-drain models. "We spoke to someone who realised he could save lots of money at his school."

→ **www.tranquilpc.co.uk**

Switched-on PCs cost the earth

One in six office PCs are never switched off at night and a further one in seven are not always switched off every day, according to a new report.

This amounts to a waste of 1.5bn kilowatt-hours of electricity a year, at a cost of £115m.

Worse, it releases 700,000 tons of CO_2 – equivalent to that released by 200,000 small cars, 120,000 4x4s, or a gas-fired power station in the same time, says the report from the National Energy Foundation.

The report was commissioned by 1E, whose Nightwatchman can centralise the power management of networked PCs in enterprises, allowing them to be shut down centrally at night.

It reckons a company with 20,000 employees could save £175,000 a year by switching off PCs left on unnecessarily. And it urges companies to make staff aware of the environmental costs of leaving PCs on.

They should also check that power-management is enabled on PCs to ensure they go into low-drain hibernation modes when left on.

→ **www.1e.com**
→ **www.nef.org.uk**

Clean claims by Panasonic

Plasma displays on sale contravene the new Restriction of Hazardous Substances (RoHS) directive, a UK analyst has warned. Pete Gamby of display specialist Meko made the claim at the launch of new monitors from NEC and Viewsonic.

The RoHS directive specified how much toxic material can be used in electrical equipment. Lead must account for no more than a tenth of one per cent of the weight.

Plasma displays have a higher percentage, but levels are hard to come by as manufacturers try to keep them quiet, said Gamby.

He said Panasonic claimed it had produced RoHS-compliant screens but it would not say how. "Dupont makes a coating that removes some of the need for lead oxide but this does not apply to all the components of a plasma panel."

It is possible to make lead-free Plasma panels, but they would be extremely expensive and emission requirements would be hard to meet, said Gamby.

Boost for solar cell efficiency

A new type of semiconductor material could lead to solar cells that convert almost half the light falling on them into electricity.

Conventional solar cells have an efficiency of about 25 per cent because they respond to a narrow range of frequencies. The efficiency has been boosted to 39 per cent by using a mix of semiconductors.

Now researchers at Lawrence Berkeley National Laboratory have produced a material that responds to low-energy photons, promising cells with an efficiency of 45 per cent.

→ **www.pcw.co.uk/2165626**

Sony Walkman cuts out noise

Sony's latest NW-S700 Walkmans come with noise-cancelling headphones to help commuters listen to music despite the noise of trains and other traffic. The MDR-NC22 headphones reduce noise by up to 75 per cent, according to Sony. Built-in microphones capture noise as an audio stream, which is inverted to generate 'anti-noise' that serves to cancel out the original.

There are 1GB, 2GB or 4GB models, all with FM tuners, with prices ranging up to £189. For more on this see **www.pcw.co.uk/2166410**.

Smallest laser printer arrives

Samsung has launched what it claims are the world's smallest desktop colour laser printers. The CLP-300 and the network-ready CLP-300N weigh 14kg and measure 15.4x13.5x10.4in.

They print 17 pages per minute (ppm) in black and white and 4ppm in colour. The CLP-300N comes with a built-in network card and costs about £200, while the standalone CLP-300 will set you back about £170. For more on this see **www.pcw.co.uk/2166296**.

Shuttle makes dual designs

Shuttle has launched a barebones system designed for Intel's Core 2 Duo processors. The small-form-factor Shuttle XPC SD32G2, based on the G2 chassis, uses the Intel 945G chipset and supports the Intel Core 2 Duo, Pentium D, Pentium 4 and Celeron D processors. It costs £265 ex Vat or a fully built unit can be created to your specifications.

→ **www.pcw.co.uk/2166157**

Mac-style MSI

MSI's new Crystal 945 barebones system has an integrated LCD monitor reminiscent of Apple's iMac. For more see **www.pcw.co.uk/2165563**.

HP handhelds keep it simple

Hewlett-Packard launched four multifunction devices last month – and said the future lies in simple, single-function devices.

Chief technology officer of HP's personal systems group Phil McKinney said most people prefer products that do one thing very well rather than a complicated general-purpose device.

He spoke at the London launch of a mobile media player, two versions of a sat-nav handheld, and a smartphone – all combining Windows Mobile software with the usual organiser applications.

The iPaq rx5700 and rx5900 Travel Companions use Tom Tom software with in-car and pedestrian modes and can connect to the web using Wifi.

Rx5900 Travel Companion showing the Windows Mobile 5.0 interface

The UK-only rx5700 has 512MB of storage and costs £299. The rx5900, which covers Europe and has 2GB of storage, costs £349. Both also act as media players.

The £199 iPaq rx4240 Media Companion is a little smaller and can be used to play videos and audio. The iPaq rw6815 smartphone supports GPRS/Edge, Wifi and Bluetooth and comes with a 2-megapixel camera.

McKinney said that although these devices support multiple functions, they appear at first sight to be single-function. "When you start up the Travel Companion you only see the GPS interface," he said. "You don't see Windows Mobile. And a lot of people who use it will not want to see Windows Mobile. They just want a GPS system."

Watch out for the walking hotspot

The wristwatch of the future could act as a 'personal communications hub', according to HP's Phil McKinney (see story above). He said it makes no sense to support the increasing variety of wireless links in every device that people carry.

Instead each device could carry a single, very short-range radio to communicate with the hub, which could extend the link using any appropriate technology such as Wimax, 3G or Wifi. "You would be a walking hotspot," he said.

Mobile phones already act as a personal hub by providing GSM, GPRS or 3G data connections to devices such as personal organisers, using Bluetooth for the local link. But McKinney said these fall short of the functionality of a hub.

He showed a concept design of a wristwatch hub, but said a more likely format would be a device the size of three or four credit cards stuck together. It would double as a personal information holder with logon details for company and other sites.

HP also showed concept designs of how smart-connected devices work in the home.

For more on this story with accompanying pictures see: **http://tinyurl.com/yfdoet**.

HP feeds multifunction printer boom

HP has launched its biggest-ever range of multifunction printers (MFPs), which it says are becoming increasingly popular.

The new machines have a claimed 10-second warm-up time and a new user interface. For heavy-duty use (200,000 pages a month) the Laserjet M5035 series offers scanning, copying, faxing and A3 or A4 printing at up to 35 pages per minute (ppm). It is the first HP A3 MFP that is small enough to sit on a desk. Prices start at £2,350 ex Vat.

The Laserjet M3035 series is designed for smaller offices with a workload of up to 75,000 pages a month. It scans or prints at 33ppm. Prices start at £1,350 ex Vat.

The M5035 MFP prints A3 but is small enough to be placed on a desk

Already in the shops is the £145 ex Vat Laserjet M1005, which prints and copies at up to 14ppm but does not offer fax.

The Laserjet CM1015 and CM1017 colour MFPs are designed for workloads of up to 35,000 pages a month. The CM1017 has memory card slots, network capability and a colour LCD. The models cost £371 and £305 ex Vat respectively.

Also launched were two mono Laserjet ranges with automatic two-sided printing: the P3005 series and the P2015 series. Prices start at £395 and £191 respectively.

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Rival HSDPA to hit 3.6Mbits

Mobile high-speed download packet access (HSDPA) links will soon hit 3.6Mbits/sec – but today's handsets and cards don't support more than the 1.8Mbits/sec maximum of today's services.

T-Mobile is rolling out an HSDPA (sometimes called 3.5G) service with a free Express Card modem, at £29 for up to 3GB of traffic per month.

It claims cards and handsets able to receive 3.6Mbits/sec will be available by early 2007. Late next year it plans to offer 7.2Mbits/sec per user downstream and 1.45Mbits/sec upstream – with equipment able to handle those speeds.

Intel plans to support both Wimax and HSDPA in notebooks within a couple of years.

Paul Senior, of Wimax specialist Airspan, said 3G and 3.5G are better at linking with fast-moving users and handing on connections. But their data services are bolted on to a voice network, whereas Wimax has been optimised for high-speed data. *Emil Larsen*

Cities set for 10Mbit Wimax

Wimax wide-area wireless broadband is coming to the UK – and it will compete with fixed cable and DSL links as well as with 3G mobile.

The first version of the technology, using the IEEE 802.16d standard for fixed links, is considered to be best suited to people in rural areas where landline links are either slow or non-existent.

But none of the rival technologies can offer fast data links in both directions so easily and cheaply, said Graham Currier, business development manager of Pipex Wireless, which plans to roll out services in UK conurbations.

Upload speeds in standard cable and ADSL services are generally a fraction of what they are when you download. Yet many companies need fast bi-directional links, and so will home and small-office users if video-telephony and remote-access security cameras become more popular. Peer-to-peer file sharing also produces high two-way traffic.

Test-rig Wimax mast

Symmetric DSL (SDSL) requires two lines and is expensive, while cable is hampered by an infrastructure that was not designed originally for interactivity, Currier said.

He sees another market among people like students who move around a lot and rely on a mobile phone rather than paying for a landline. "Wimax will allow you to get broadband without tying yourself down," Currier added.

Pipex Wireless, which is backed by Intel, owns enough spectrum for 16 channels between 3.6GHz and 4.2GHz. Currently this is licensed only for fixed use, but it is expected to be approved for use with the recently ratified 802.16e mobile flavour of Wimax.

Intel has just unveiled a second-generation Wimax chip that is software upgradeable to 16e. It is expected to be implemented as standard on Intel-based notebooks within a couple of years.

Surprisingly, Currier does not like 16e being called mobile. "It is misleading," he said. "As far as I am concerned it allows us to offer more and better services."

Nevertheless, 16e Wimax would give untethered devices broadband links at up to 10Mbits/sec (see box below). Pipex Wireless is deploying a trial 16d Wimax network in Milton Keynes; it, too, is software upgradeable to 16e.

Testing wireless broadband in Shakespeare country

What speeds are we likely to get in practice with Wimax? Pipex Wireless took journalists to a farm near Shakespeare's birthplace at Stratford-upon-Avon to find out.

Airspan, which is supplying the Intel-chipped equipment and infrastructure for the rollout, has a test rig at the farm (see picture in the story above). Wimax masts will split their coverage area into three 120° or six 60° sectors, depending on the number of users. Each sector uses different channels and those facing each other on neighbouring cells will never use the same ones to avoid contention.

The first test was a little disappointing. In an open space 800m from the base station, the fastest data rate we could get in either direction was around 2Mbits/sec. Airspan's Paul Senior insisted that tests had achieved 10Mbits/sec earlier, and of course this was a test rig; but it showed the technology was fallible.

Surprisingly, we got better reception among houses. Airspan has rented one on an estate about 1.5km from the base station. We downloaded a 10MB file from a server attached to the base station in just 9.7 seconds, a rate of 8.25Mbits/sec; we also uploaded the same file in 13 seconds (6.15Mbits/sec), showing that you could get good speeds both ways.

Above left and right: Indoor and outdoor Wimax user aerials. The thin black antenna on each is for local Wifi links. Far right: Software-upgradeable base station driving antennas

These results were gained using an outside Wimax aerial (pictured above centre) pointing away from the base station, and on the far side of the house. Curiously, data rates were slightly lower when we switched to another aerial on the nearside and pointing towards the base.

Senior explained that this was because Wimax reception is assisted by signals bouncing off buildings. With an indoor aerial data rates dropped to around 2Mbits/sec. This is significant as an outdoor aerial would require an expensive visit by an engineer, whereas anyone could set up an indoor Wimax rig.

Both Wimax and Wifi were used in the house: one for wide-area links and the other for local connectivity. Wimax latency – the time lag caused by the wireless link – is said to be lower than with 3G, pinging at 30-40 milliseconds, compared with 300-400 milliseconds.

Europe goes slow on fast UWB links

Devices that allow you to retrofit wireless USB connectivity onto products will be available by the end of the year – although the technology is unlikely to be approved for European use for at least another year.

It will replace a USB2 cable with an Ultra-Wideband (UWB) wireless connection rated at 480Mbits/sec. Dongles and hubs that enable you to connect a PC wirelessly to standard USB2 peripherals will hit the market within a couple of months, said Eric Broockman, chief executive of UWB specialist Alereon.

In the rest of Europe, the technology will take longer to get through the regulatory authorities, but Broockman believes that will happen in a few months.

The 11n version of Wifi is expected to be approved within the same timeframe. Estimates of the data rates it will provide have varied but it may hit UWB speeds, making it a potential rival for tasks such as video streaming.

Bluetooth UWB in action: streaming video from a camera to a wall display

But Broockman said UWB is at least eight times more efficient in terms of watts per megabyte of traffic and causes fewer network problems. "With UWB, if you have a signal you can use it, and the data rate drops off sharply after a certain distance; 11n can still cause contention even if the signal is too weak to use."

He pointed out that 11n requires multiple antennas, which will not be possible with small devices such as mp3 players.

Bluetooth is also set to be implemented over UWB, giving it higher data rates, perhaps as soon as 2008. "We will have an initial draft spec by the end of this year year," said Mike Foley, executive director of the Bluetooth Special Interest Group (SIG).

Bluetooth UWB modules will support both technologies, with slower data-rate tasks still being done by Bluetooth. Tasks such as video streaming will be done by UWB, and in some cases the chips will decide what link to use.

The advantage of a Bluetooth device is that it can go into a room, detect what devices are available, and use those for which it has permission. This ability has yet to be built into other UWB modules.

It means, for instance, that you could tell a videocam equipped with Bluetooth UWB to screen holiday pictures on the nearest large screen (see picture). *Clive Akass*

→ **www.alereon.com**

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The amazing 'programmable matter'

As promised in PCW last month, here is more on the astonishing morphing technology researchers claim will be able to precisely clone anything within 20 years. Clive Akass reports

Researchers in the US are developing 'programmable matter' called Claytronics to realise the sci-fi dream of an entity capable of morphing into a likeness of any man, woman, thing or beast. They reckon that within two decades a talking, walking Claytronic human morph could be visually indistinguishable from the person it represents.

The entities will consist of millions of microscopic units called catoms – short for Claytronic atoms – a misleading term because they have more in common with organic cells as small, complex units that co-operate en masse to form a big organism.

Each catom has its own processor, memory, means of locomotion, a sensor or two, a 'video skin' capable of showing any colour or texture, and some way of communicating with its neighbours.

Each will also be able to stick to or unstick from a neighbour using software-controlled nanofibres that work like Velcro so that no energy is required to maintain a bond. Most experimental catoms have been too big for this to work and have relied on more power-hungry methods. But Robert Reid of the US Air Force Research Lab, has shown how catoms 1mm in diameter could be mass produced (see below).

Catoms will have no moving parts but move relative to each other using electrostatic or magnetic forces. Masses of catoms will be able to move and ape human movement by using these forces co-operatively.

Developing the software to drive Claytronic entities is at least as big a task as developing the catoms themselves, said lead researcher on the project at Carnegie Mellon University, Professor Seth Copen Goldstein. The software will generate what is called a 'pario' data stream, which will be to Claytronics what a video stream is to a display.

Pario (Greek for 'to bring forth') thus becomes another multimedia data type, like audio and video.

"We are already getting to the point where we can shape things and move them around in a very robust way," Goldstein said.

The massive processing required for this 'dynamic physical rendering' (DPR) naturally attracted Intel, which is a partner in the project. The result, if you credit what the researchers are saying, will make the classic *Star Wars* moving hologram of Princess Leia look primitive.

Intel suggests that Claytronic replicas of firefighters and medics (and presumably soldiers) could go into areas that would be too dangerous for humans. But replicas would not have to be the same size as the originals: you could watch football games in 3D using miniature replicas of the players and stadium.

The system could even be used to extend videotelephony, so that you could be talking to a replica of someone as if they are in the same room as you.

Goldstein said that timescales will depend to some extent on how fast manufacturing technologies progress, because the catoms would need to be mass-produced very cheaply. He reckons catoms that can replicate people could be available in five years, but these would not be good enough to be mistaken for the real thing.

"If you ask me how long it will be before you can talk to me in a room and not know whether I am really there or speaking from a long way away, I wouldn't want to say. But if you pushed me I'd say within 20 years."

This sounds intriguingly like a visual version of the Turing test, suggested by mathematician Alan Turing as a way of judging whether a computer could carry out human-like conversation. The tester would interact verbally with both a computer and a person without being able to see either. The computer would 'pass' if it could be mistaken for the human.

In fact, Goldstein said, the verbal Turing test is far harder to crack because it involves artificial intelligence. The Claytronic morphs are no more intelligent than a display; they differ only in rendering a dynamic 3D form rather than a 2D image.

There seems, however, to be no reason an AI computer capable of conversation should not speak through a Claytronic morph, giving itself the extra task of generating plausible body language as well as speech. So perhaps the Turing test of the future could be done at the dinner table with a robot and a human as guests.

Stick together and we can go a long way...

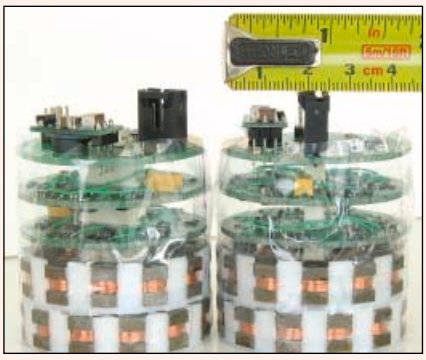
These experimental catoms hardly seem to justify the astonishing claims being made of Claytronic technology. But they are the Claytronic equivalent of the first transistors: working devices for which the technology can be developed before miniaturisation and mass production become possible.

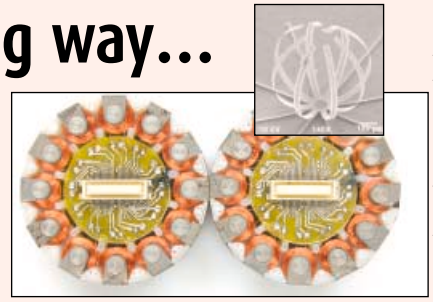
The lower two layers of the catoms (pictured right) consist of two rings containing a total of 24 electro-magnets used at this scale to bond with or repel neighbouring devices. First-generation miniaturisation will probably use electrostatic charges for this. Later generations will use nano-fibres.

The upper layers of the catoms include wireless links and logic; not shown is a top layer containing a tiny display. These experimental devices work only in two dimensions, but the technology developed using them should scale up to three.

Robert Reid of the US Air Force Laboratory demonstrated how this also applies to manufacture. He produced a 1mm sphere that 'self-assembled' by curling up from a two-dimensional shape.

The significance of this is that catoms could be mass produced using processes similar to those used to make silicon chips.





Picture: Robert Reid, Air Force Reseach Lab

Left: Experimental catoms demonstrated recently at the Intel Developer Forum. Top inset: Spherical structure that self-assembles from a 2D sheet Above: Magnet assembly, with controller chip

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Vote for the best of 2006

The end of the year is rapidly approaching, which means it's time for us to ask you for your opinions on the products and brands you've purchased throughout the year. Your votes will decide the winners and losers in the *PCW* Awards for Excellence 2006, an award that celebrates excellence in technology, design, support and value for money.

And to show our appreciation for taking up your time, we've got some great products lined up in our special prize draw for all those who cast a vote.

We're looking for reader-chosen winners in 18 categories of product (listed below) and additional editorial awards will be chosen by the *PCW* team. In each category of the online-only survey you'll be presented with a list of manufacturers to choose from. Make your choice and tell us the main reason you've chosen a particular brand by ticking one of the check boxes provided (After-sales support & service, Product design & style, Technical excellence or Value for money). It's as easy as that. Everyone who votes in the survey will get a chance to win one of the great prizes listed opposite.

Thank you in advance for your help, and good luck!

Voting commences on 16 October 2006 and closes on 15 December 2006.

Results and a list of prize winners will be published in the first issue of *PCW* to go on sale in January 2007.

VOTE ONLINE AT www.pcw.co.uk/awards

The awards categories

Reader voted awards

Prizes in the following categories will be awarded based purely on reader votes received via our online survey at **www.pcw.co.uk/awards**. Voting closes on 15 December 2006.

- **Best broadband ISP**
- **Best desktop PC manufacturer**
- **Best digital camera manufacturer**
- **Best digital home entertainment manufacturer**
- **Best GPS (sat nav) manufacturer**
- **Best graphics card manufacturer**
- **Best hard drive manufacturer**
- **Best inkjet printer manufacturer**
- **Best laptop manufacturer**
- **Best laser printer manufacturer**
- **Best memory manufacturer**
- **Best multifunction printer manufacturer**
- **Best monitor manufacturer**
- **Best motherboard manufacturer**
- **Best networking equipment manufacturer**
- **Best online retailer**
- **Best PDA/smartphone manufacturer**
- **Best portable entertainment device manufacturer**

In each category, readers must say which one of the following excellence criteria is the most relevant to their chosen winner

1. After-sales support & service
2. Product design & style
3. Technical excellence of products
4. Value for money of products

Additionally, there will be room for brief comments on the survey form.

Editorial awards

PCW's editorial team will choose winners in the following categories based on our assessment of a product's overall excellence.

- **PCW product of the year**
- **Best component**
- **Best laptop**
- **Best desktop PC**
- **Best peripheral**
- **Best software**
- **Business product of the year**

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First prize – Shuttle XPC G5 8300H PC worth £850
The Shuttle XPC G5 8300H's clear and elegant lines will add style to any living room. This small cube packs plenty of punch, and is ideal for the discerning home user. The latest technologies are included, such as 512MB of DDR400 Ram, integrated Intel PCI Express graphics, Intel Celeron D351 3.2GHz processor and a Gigabit Ethernet network port. There's also a 16x dual-layer DVD writer, a 200GB serial ATA hard disk and a mouse and keyboard. To complement this superb system, there's a Shuttle XP17 TempAG v2 17in TFT monitor with a fast 8ms response time, 1,280x1,024 pixel resolution and 500:1 contrast.
→ **www.shuttle.com**

Runner-up prizes

Tiscali ADSL Max broadband package – worth £215
Tiscali is offering one winner the chance to enjoy a year's Tiscali ADSL Max broadband connection. This provides unlimited monthly usage with a download rate of up to 8Mbits/sec. Tiscali will also provide a free modem and connection as well as free email, anti-spam and anti-virus protection as standard.
→ **www.tiscali.co.uk**

tiscali.

10 Crucial 2GB Gizmo Overdrives worth £42.29 each
Despite their small size, these high-speed Gizmo USB memory sticks can store up to 2GB of data and are perfect for transferring video, music and photos between PCs. We've got 10 of these great devices to give away.
→ **www.crucial.com**

Crucial 2GB Ballistix memory kit – worth up to £294.91
Crucial's Ballistix memory is specifically built for demanding performance enthusiasts and features integrated aluminium heatsinks and low latency. One lucky winner will receive a 2GB kit that's matched for compatibility to your existing system.
→ **www.crucial.com/uk**

10 copies of PCW on CD-Rom worth £14.99 each
Ten winners will receive the brand new edition of *PCW* on CD-Rom, which contains searchable and printable full electronic versions of the January to December 2006 issues of *PCW*.

Terms and conditions

Readers must vote in at least two categories but do not need to vote in every category. You may not vote for any company that employs you or with which you have a professional relationship. Vendors may not vote for themselves. Entries without the requested contact information will not be entered into the prize draw. Votes must be in by 15 December 2006. Breaking of any of the terms and conditions will result in your vote being considered null and void.

This prize draw is open to all qualifying participants in the *PCW* Awards for Excellence survey. *PCW* is the sole judge of the prize draw and the Editor's choice is final. Prize offer applies to residents of the UK and the Irish Republic only. Entrants must be over the age of 18. Winners will be selected at random from all complete survey entries received. No cash alternative is available in lieu of prizes. VNU reserves the right to substitute the prize for one of greater or equal value if circumstances make this unavoidable. Prizes will be dispatched by the competition sponsor(s) and the winner(s) name(s) and address(es) will be provided to the competition sponsor(s) for this purpose. No purchase of the magazine is necessary to enter the prize draw. VNU will use all reasonable efforts to ensure that the prizes are as described on this page. However, VNU cannot accept any liability in respect of any prize, and any queries regarding a prize should be taken up directly with the sponsor of that prize. Broadband packages are subject to availability in the winners' area, plus Tiscali's normal terms and conditions.

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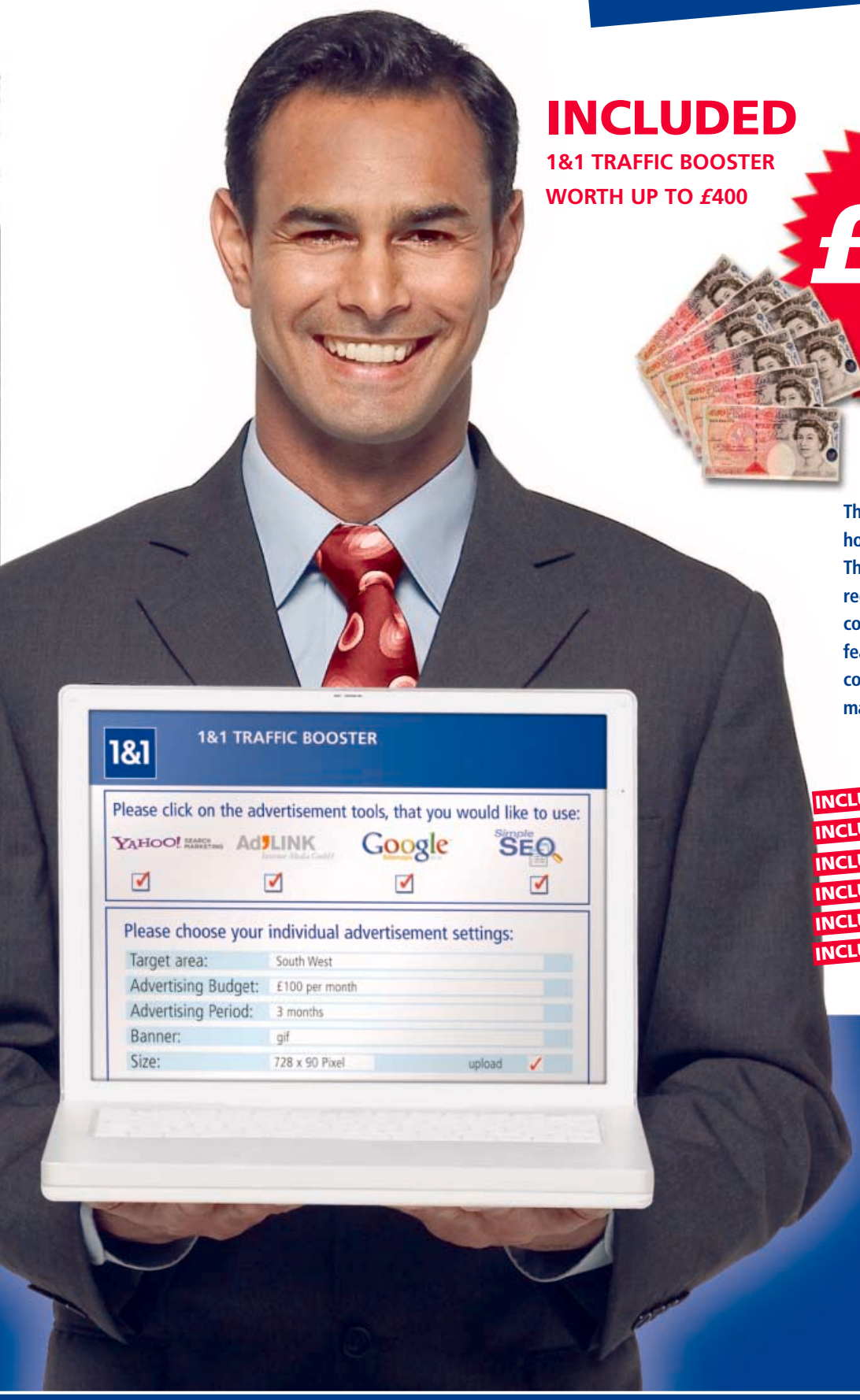

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LETTERS

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Send your email to letters@pcw.co.uk

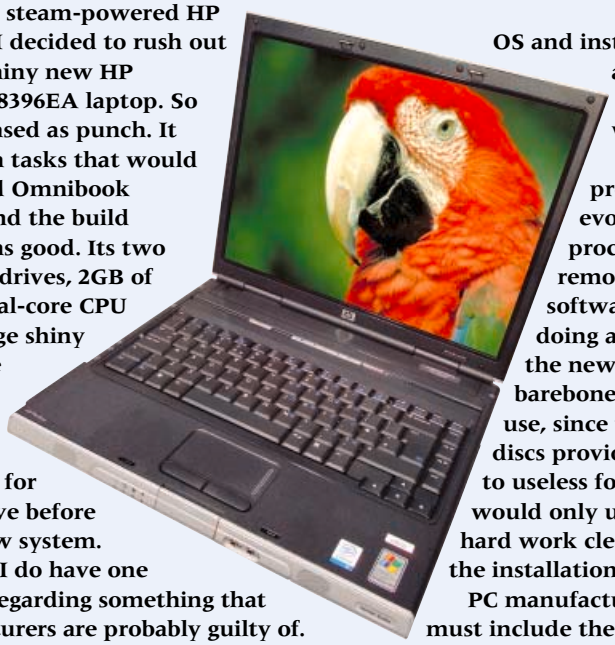
LETTER OF THE MONTH

Tribulations and trials

After several years of struggling along with my old steam-powered HP Omnibook, I decided to rush out and buy a shiny new HP Pavilion DV8396EA laptop. So far I am pleased as punch. It flies through tasks that would leave my old Omnibook struggling and the build quality seems good. Its two 120GB hard drives, 2GB of memory, dual-core CPU and that huge shiny screen made me forget about my cunning plan to wait for Vista to arrive before buying a new system.

However I do have one complaint, regarding something that all manufacturers are probably guilty of. Why must they always insist on pre-installing loads of software that they think we need, or want? Trial versions of this or that, cut-down CD/DVD burning applications, photo-editing packages and other applications whose exact purpose remains a mystery.

The first task I carry out with a brand new 'out of the box' system is to spend (or waste?) several hours, sometimes days, fiddling around deleting all this bloatware before cleaning up the (hopefully undamaged) OS and installing the applications we actually want to use. My own procedure has evolved into a process of removing this software before doing a full backup of the newly cleaned barebones OS for future use, since the restore discs provided are next to useless for this. They would only undo all my hard work cleaning up the installation.



Do we really need or want pre-installed software?

PC manufacturers, if you must include these extras, please at least leave the discs for all this unwanted software in the box and give users the option to install or chuck them out as required. Of course, if they would include just a Windows disc (as in the good old days), we could simply format and reinstall a nice 'clean' OS.

Ken Park

Kelvyn Taylor replies: It sounds like you should have a chat with Barry Fox – read about his similar gripes on page 38.

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HD-UNREADY

There is much being written in your magazine and elsewhere about all the latest 'must-have' technologies: HDTV, Blu-ray, wireless access and all the rest. Maybe I'm just not keeping up to date, but I'd like to pour cold water on some of them.

First, HDTV doesn't really offer anything new over DVD apart from a higher-resolution picture. It's certainly no reason to rush out and get Windows Vista or a new PC, because watching TV or films on a PC is not a pleasurable experience. Nobody wants to sit in an office chair to watch the entire *Star Wars* series on their desktop PC when they can do the same on a big screen in the comfort of their lounge. Even then, there is little point in using a Media Center PC. A standalone player costs less, is simpler to operate and doesn't require virus protection or constant maintenance.

Wireless networking is similar. It's convenient and saves installing network cables. But for connections at home (as opposed to out and about), my experience of wireless is that it is unreliable, prone to slow down or disappear for no apparent reason, and plagued by potential security problems. Even when working

↘ Unless otherwise stated, letters sent to the Editor, PCW team or contributors will be considered for publication. Letters may be edited for clarity or length.

properly, it is still slow. The latest 'draft-n' wireless networking kit provides a theoretical maximum link speed of about a third that of gigabit Ethernet, which is standard on even the cheapest PC.

For the moment, I'll stick to my wired network, standard TV, Freeview box and DVD recorder. I don't feel that I am missing out on anything important.

Jonathan Marten

Kelvyn Taylor replies: Don't forget that you could have said the same about your current equipment list not too many years ago! But of course, if everyone shares your opinion, those new technologies will fail. In the end, it's consumers who make the final decision via their wallets.

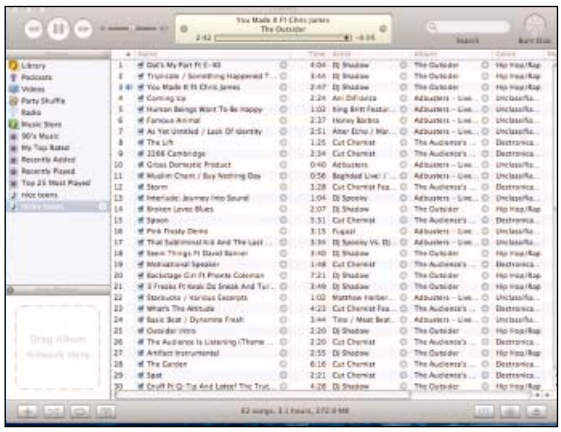
NOKIA BACKUP

I have a Nokia mobile phone and have just downloaded the latest overbloated Nokia software to back up the numbers stored in my phone memory. It is not very user friendly and it's impossible to keep the precious numbers in other locations, such as a CD or external hard drive. Having just suffered a laptop hard disk failure, I am a bit sensitive about this.

Could you get someone to write a simple program, probably shareware, to download the numbers to a two-column spreadsheet and include it on your cover CD? This is the approach Sim card readers take, but sadly Nokia does not. The program sould be simple to download, use, edit and upload to the phone.

Ian Rutter

This is a call: Nokia's backup software needs simplifying



'Unknown' pleasures: iTunes loses it

ITUNES, I WANT MY MUSIC BACK

Having been a fan of iTunes for a long time, I wouldn't touch the new version with a bargepole.

I downloaded and installed it and it promptly reorganised all my music files by adding superfluous information, changing the names and completely reorganising the file structure on my hard disk, renaming the folders and files.

How dare Apple think it knows better than me how I want to find my music? It has taken me two days so far to uninstall it and reorganise my data. Anything iTunes didn't recognise has been labelled 'unknown', so I have to try to work out what it is.

Needless to say, I am now trying an alternative application.

Andrew Jolly

EASY VHS TO DVD

I read with interest your guide to converting VHS to DVD (*PCW* December 2006 and online at **www.pcw.co.uk/2166225**). Why does nobody mention the easy way of digitising tapes? I have a VHS player downstairs with my TV and a PC with a TV card upstairs. The TV, video player and PC share a co-axial aerial cable.

To convert VHS to DVD I simply plug the aerial cable leading to the PC into the RF output socket of the VHS. I have tuned a channel of the TV tuner card to the same channel as the VHS. I watch the output of the VHS as an analogue TV signal and record at the same time onto the PC. This gives me an Mpeg2 file that can be edited and burned to DVD in the normal way.

The sound is only mono, but this doesn't really matter if I'm converting home videos or old analogue recordings. There is no need for extra wiring and the VHS stays with the TV where it belongs. Quality seems better when I used S-video connections.

Rodney Bryant

VIRTUALDUB RULES

I found Ken McMahon's feature 'Convert analogue videos into DVD' interesting – especially with regards to the excellent but often underrated program Virtualdub. I'd like to add some points.

The link given in the article for download of Video Denoise now leads directly to a superb plug-in from Neatvideo, which I have used and found stunning. This plug-in is based on its excellent Neatimage for digital photography. It is slow but well worth the time on noisy video.

There is also a plug-in for Virtualdub offering Vectorscope and even Waveform display. It's called Color Tools and can be found at **www.trevlac.us/colorCorrection/colorTools.html**.

I now have more than 60 plug-ins for Virtualdub, offering almost any type of processing. Maybe for the interest of other readers you could publish a list of what is available.

Incidentally Virtualdub can also be used for video standards conversion and aspect ratio conversion as well as for all forms of video adjustment.

I also have Adobe Premiere but Virtualdub is invaluable as it offers many features not available elsewhere and certainly not for free.

Gordon Hathaway

POWER DOWN

Ian Selkirk (Letters, *PCW* December 2006) makes some good points in saying that consumers want to be able to choose more environmentally sound computer kit. One simple thing that *PCW* could and should do is to measure and report on the energy consumption of equipment being tested. For me, the energy consumption rating would be far more useful than Sysmark, PCmark, Mobilemark and so on. This is particularly true for devices that are likely to be left running 24 hours a day, like the Nas devices you conducted a group test on in the same issue.

For businesses, energy bills are an increasing worry, so reducing a PC's electricity consumption by 50W is more likely to be of value than having a slightly faster processor. I look forward to the day when a *PCW* writer says in a hardware review "It may be the fastest on test but its poor energy performance lets it down, so it has failed to get a recommendation". Maybe then manufacturers will start to consider the impact of their design decisions.

Simon Tompsett

NAS GROUP TEST

I would like to point out an error in your recent Network-attached storage devices group test (*PCW*, December 2006). I have a Buffalo Terastation and the device does support Raid 0, but the company calls it spanning rather than striping. Also the box does support Linux and Apple Mac clients via ↘

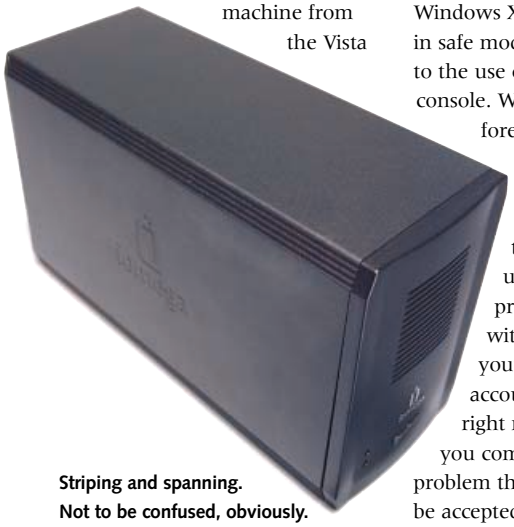
Samba shares. The Client Utility cannot be used on these platforms, but the Terastation does get its initial IP address from any available DHCP server or uses 192.168.0.100 as default.

Although the Terastation is the second most-expensive tested, it's the second cheapest per gigabyte.
Mike Blackett

Cliff Joseph replies: You're right in that you can access the Terastation (or any other Nas box) simply via its IP address from any computer. However, Buffalo doesn't officially support Mac or Linux clients with the Terastation, so you won't get any technical support on these platforms. Striping and spanning are very different techniques: Buffalo only claims to support spanning.

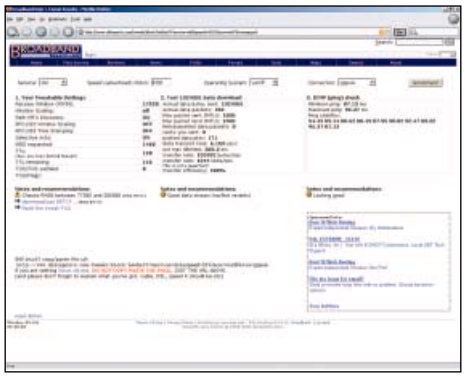
OEM XP GOTCHA

How ironic that I should read in the latest *PCW* (Don't panic, December 2006 and online at **www.pcw.co.uk/2167121**) – just days after my laptop's XP installation crashed and could not be recovered – that Windows Vista has a built-in start-up repair tool that will solve all your problems with a few clicks of the mouse after booting up your machine from the Vista DVD installation disc. I wonder if this will also be conditional on the use of a genuine retail Vista DVD and perpetuate the double standards that now exist with XP, which most users are unaware of until it is too late. I refer to the use of computers that use pre-installed versions of Windows XP, which is the way I imagine most users buy computers these days.



Striping and spanning. Not to be confused, obviously.

If you have a computer like this, even if you have a recovery disc with a full installation of XP on it (as I have with two laptops I have bought in the past few years), it's an OEM version. This is different from that on 'ordinary' retail XP CDs. So when you have a problem and your Windows XP won't boot, even in safe mode, it's no good turning to the use of the recovery console. Whether you have the foresight to install it on your computer or run it off the disc, it won't work. It falls at the first hurdle – the use of passwords. If you protect your computer with a password to enter your administrator's account – and who in their right mind wouldn't – then you come up against the problem that the password won't be accepted. It's thrown out as invalid even if it's correct. And there is no way around it. There



See the feature on page 46 for information on how to test your broadband connection

is supposed to be, if you are clever enough to install the recovery console before you need it, a 'hotfix' to correct the problem. Except that you can't get it – or I haven't been able to, although I have searched. But this is after the event anyway.

Because I couldn't get the recovery console to work as it should have done, since I was stupid enough to use a password to log on to my computer, I have been forced into a reinstallation of XP, which could probably have been avoided. So all I can say about the new repair facilities in Vista is that the proof of the pudding will be in the eating.
Bob Isgar

Kelvyn Taylor replies: You seem to be referring to the Knowledgebase problem documented at **http://support.microsoft.com/kb/308402**. *This is an important 'gotcha' for some OEM Windows XP installations, and a support call to Microsoft is required to obtain the hotfix (Q308402).*

SLOW, SLOW, QUICK QUICK, SLOW

I regularly test my broadband speed, which was bought as 2Mbits/sec service. I understand the importance of factors such as distance from exchange, contention rates and so on, but I have noticed that the measured speed is dropping off, probably as more people come online.

Am I being cynical for thinking that the increased speeds being offered (up to 24Mbits/sec) are designed to cover up the real speed decreases as more people come online? Perhaps when the number of people online reaches the high percentages, the 24Mbits/sec speed will drop as far as 2Mbits/sec?

And while I'm in rant mode, am I the only person who takes exception to the manufacturers selling 'broadband routers' that do not have the ADSL modem included? I know they can be used with cable but that is really a network connection – surely they are nothing more than routers? Admittedly if you look closely at the box it does make this clear, but it is another case of overselling the product.
Mike Bennett

Kelvyn Taylor replies: You'll find everything you need to know about broadband speeds and contention in our feature on page 46. Regarding broadband routers, we agree entirely. In PCW we prefer to call them routers (no modem) or broadband routers (with modem).

WIN Next month's prize for the letter of the month is Imation Disc Stakka

The Disc Stakka is an automated device that stores, protects and retrieves optical media, such as CDs, DVDs and games discs. It holds up to 100 12cm discs and can be linked to a PC or Mac via its single USB connection. The carousel can be stacked up to five-high and hold up to 500 discs in any format.

The Disc Stakka comes with Opditracker content management software, which includes a database and search engine that can find and eject any disc within seconds. For more information on the Disc Stakka, go to **www.imation.co.uk**.

CLARIFICATIONS & AMPLIFICATIONS

On page 16 of our December 2006 issue we mentioned a program called Copy+. Unfortunately our description of its functions was incorrect: this program simply lets you copy the content from your Sky+ hard drive to a new drive for upgrading purposes. It doesn't let you extract or watch the recorded programs on your PC.

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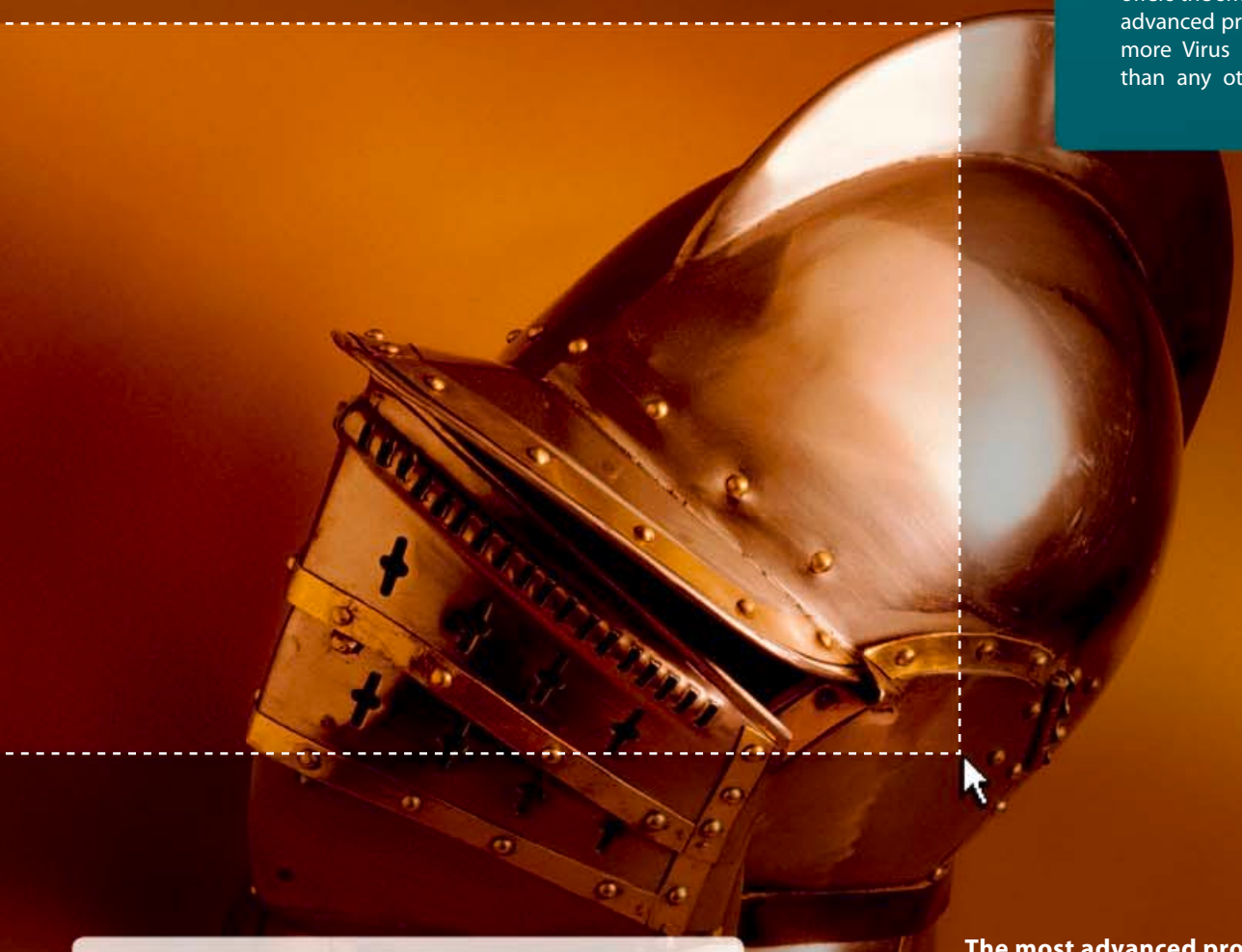

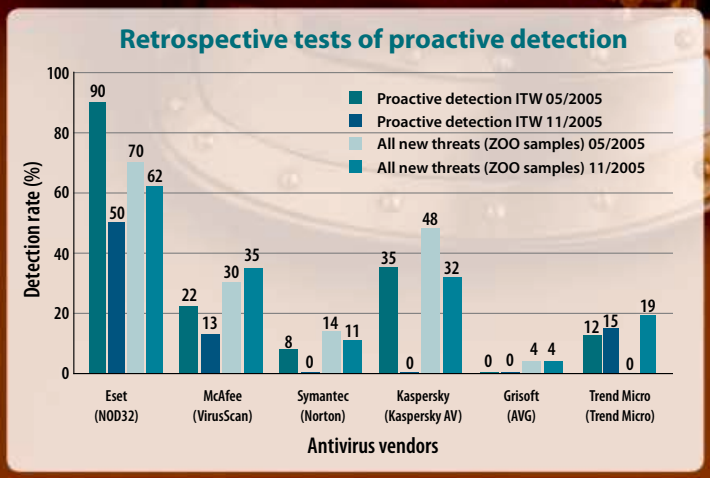

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Gordon Laing

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Stop this megapixel madness

Camera manufacturers need to stop chasing higher resolutions at the expense of image quality, says Gordon Laing

Every other September the photographic industry descends on Cologne in Germany for the Photokina trade show. It's here where you'll discover what's big for Christmas and the trends in cameras for years to come. Worryingly, though, it would appear the camera industry's still playing a numbers game, and often at the cost of quality.

The theme this year was 10 megapixels – it seemed to be the key feature of every new camera, whether digital SLR or compact. Ever-increasing numbers should come as no surprise in the technology industry – rarely a month goes by without processor clock speeds and hard disk capacities increasing. The difference is, while we may question the need for faster PCs with increasingly cavernous storage, they are at least genuine improvements with few, if any, downsides.

'Stop obsessing with megapixels as an exclusive measure of performance'

In contrast, when you increase the resolution of a digital camera sensor without making it physically any larger, you reduce its light-gathering power. Sure, it's possible to increase the sensor's efficiency by exploiting gaps between each pixel or improving the tiny lenses above them, but in most cases the individual pixels are getting smaller, which makes them less sensitive. To compensate, the camera must amplify the signal more, which increases undesirable electronic noise.

Electronic noise can be seen as tiny random speckles on a picture, like snow on a badly tuned analogue TV signal. Noise levels become worse as the camera struggles to receive sufficient light and is forced to amplify the signal to compensate. The camera either has to leave the noise speckles on the image or smooth them out with noise reduction, in turn smearing fine detail.

In the past, noise was an acceptable compromise when shooting under dim conditions with high sensitivities. However, noise can creep into images taken under bright conditions with low sensitivities – which brings us back to 10 megapixels.

Ten megapixels present little concern to digital SLRs because their sensors have sufficiently large surface areas to ensure low noise results, even at higher sensitivities. The sensors used in compacts, though, typically have surface areas 10 times lower, yet may pack in the same number of pixels. As a result, sensitivity plummets, amplification is increased and noise levels become a serious issue even at relatively low ISO settings.

There used to be a time when we'd say noise became an issue above, say, ISO 800, but when you have to shoot under ISO 200 to avoid it, the situation becomes ridiculous. Take Panasonic's Lumix LX2 for example. It's a lovely compact with a great lens, optical stabilisation and widescreen capabilities, but its 10-megapixel sensor delivers more noise than I'm happy with, even at ISO 100.

Manufacturers could argue noise and noise reduction are essentially invisible at lesser screen magnifications or on smaller prints, but doesn't that defeat the point of a 10-megapixel camera? If I had 10 megapixels, I'd want to make big prints or view a wealth of detail on screen at 100 per cent. After all, if you only want postcard prints you could get away with five megapixels and still have enough left for cropping.

Where are all the new 5-megapixel cameras? Most manufacturers, carried away by the marketing of bigger numbers, are offering seven megapixels as a minimum on their new models this Christmas. One of the few exceptions is Fujifilm, which has sensibly stuck to six megapixels for its F30 compact, delivering relatively low noise compared to rival models.

Some compacts handle noise better than others, and only you can judge if it has become an issue. I'd recommend anyone considering a high-resolution compact visits a friendly dealer and fires off a few images at all ISOs with their own memory card so they can examine the results.

I'll be the first to admit I'm fussy when it comes to image quality and spend far too much time examining images on screen at 100 per cent, but this latest jump to 10-megapixel compacts is one too far. The industry has to stop obsessing with megapixels and using them as an exclusive measure of performance. It's compromising overall image quality and spoiling many otherwise excellent cameras. **PCW**

Barry Fox

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Descent into Dell

Barry Fox is fed up and wants someone to help him just plug and play, not plug, update and play

Who will be first to clean up by offering a Windows PC that is easy to set up and protect from internet infection? I don't mean easy for company suits with in-house IT support. I mean easy in the real world where most customers live.

Most of my PCs have been Dells. Despite the hellish help service I've experienced they are very good value for money. Most of my friends have bought Dells, too, on my recommendation. As a result, I have often ended up setting them up.

Last year I asked Dell why even consumer-targeted Media Center PCs needed such user-unfriendly End User Licence Agreement (EULA)-signing, registration and updating. Dell said the company was looking at this.

So in readiness for Vista I conducted an expensive experiment and bought a high-spec Dimension 9150 Media Center. I deliberately let it be known that I was buying as a journalist. I then logged the setup experience to see if things had improved. If anything it's worse.

'I asked if Dell's spokeswoman had set up a Dell PC without leaving it to an IT expert'

The log runs to many pages of notes and took the best part of a miserable weekend. I was using broadband so there was no time lost on slow access. There is no printed manual, just a flimsy start guide. To get a hard-copy manual you have to print 148 pages of A4 from the PC. This consumed a complete inkjet cartridge and a lot of paper. The Media Center came with an analogue TV tuner as standard. In some parts of the UK it will be obsolete by 2008.

There were nine unavoidable EULA licences and registrations to read and accept. To read them would have taken until Christmas so I have no idea what I accepted. During all this nonsense the pre-installed software needed eight unavoidable updates and restarts with two more to install Real Player as needed for my favourite Californian jazz site.

When I ran Windows Update it found 36 high-priority updates, six optional software updates and two hardware optionals – a total of 42 updates and 40.9MB.

I was asked user-scaring questions like "what is your IP address, Subnet mask, Default gateway, Preferred DNS?" The PC came with McAfee virus protection and a three-year subscription, but immediately tried to sell me a fourth year subscription and asked for 'information' on the Google Toolbar which had just been installed during the routine system setup. McAfee then warned of 'infection by ExploitURL.spoof.gen', assured me it had been deleted, but went on to repeat the warning over and over again.

All this was before I could start installing third-party software, transferring data, music and photos and importing my internet favourites.

The PC came with Microsoft Works 8, which has improvements over the Works 7 on previous Dells. One 'improvement' is that the v8 print function defaults to printing every database record, and could not be set to default at what most people surely want – printing the current record only. My previous shortcut for entering the current date (Ctrl & ;) no longer worked and any attempt at altering a data layout gave a runtime error message.

It took a lot of hassle and risky folder deletion to completely uninstall v8 and allow reinstallation of v7 from some old discs. Only then did Works work.

My network did not work and told me to contact my administrator, who is me.

I asked Dell for an attributable comment from a senior manager. I also asked if Dell's spokeswoman had ever set up a Dell PC without leaving it to an IT expert, because if she had she would know what I was asking about. Despite delaying this column for a month to wait for promised comments, none came. Draw your own conclusions.

Which brings us back to the original question. Who will be first to cut through the nonsense and offer customers the option to provide some advance information, pre-agree one all-embracing authorisation form and then get a PC with all but the most personal details pre-entered, EULAs signed and updates downloaded?

Philips, with so much experience in consumer electronics, could and should be able to do it. But I am not holding my breath. If I had to put my money on anyone, it would be Tesco or maybe PC World. I don't care who does it. I just want to duck out of setting up other people's Dells. **PCW**

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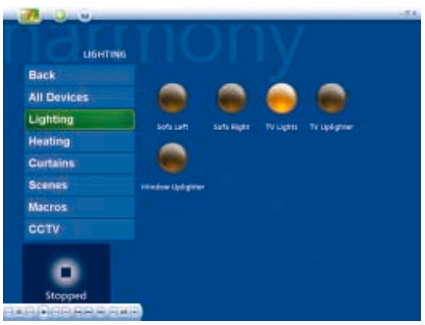

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Guy Kewney

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The price we have to pay

Will we watch all TV via the internet in a few years? Not unless someone's making money from it, says Guy Kewney

Before you decide that computers are the future of TV, ask yourself how many hours there are in your day. And how many of them cost you nothing? Your broadband probably costs you about a pound a day. So if you found something that used your broadband link continuously, each hour would cost you only 4p. Then again, if you had to be there watching the process, you'd have to add the cost of the income you were losing by not doing real work.

A visit to the cinema costs, say, £10 including bus fare. A trip to a restaurant, maybe £30 a head. A phone call to a friend during the evening could cost £1 or £10. Now look at yourself from the point of view of your local broadband and communications provider, and think: "How can I get this idiot to spend more money?" There are only two obvious things the internet can do to coax you to spend more. Charge more per minute or make you spend more minutes on paid-for services.

'There are only two obvious things the internet can do to coax you to spend more'

There is an alternative and the best example I can give is backup. The idea of backup is that it should never be used. It's like a spare tyre on a car; you make sure it's there and you hope it works if you need it… but you hope you never will. So selling backup services is the ideal communications scam: the customer pays you every time they upload data to your server, but never actually download it. Properly sold, you can arrange that they upload only tiny amounts of data, but do it several times a day, uploading each paragraph as it is stored.

Applications like this are not consumed in real time. They are compressible in a customer's day. For another example, take your RSS feed. OK, it's free – but suppose you were somehow persuaded to subscribe to a better, faster, newer, smarter RSS feed that cost money. You would be able to consume it without actually reading it: all you have to do is scan the headlines. "Boring, old, old, boring, stupid, old, boring..." and then once in a while: "Wow, I'd better read that..."

The future of TV may be something like that, but that's no way to make money. Commercial TV makes its money by selling advertising, and nobody willingly watches the adverts – if you can, you fast-forward through them.

What the internet does for TV is good news and bad news. The good news is that it can charge you for individual clips. You want to see the expression on Guy Goma's face? You don't have to sit through half an hour of *News 24* first. Whatever is the 'must see' clip of the day is highlighted on Youtube and all the marketing director has to do is discover a way of making you buy that clip, rather than download it free. But the bad news is that you don't have to watch the advert. Bang goes the typical TV station's income.

A lot of people are getting excited about the idea of transmitting live TV to your mobile phone or laptop. The idea seems to be that you and I will dig into our wallets for the convenience of being able to see what we want to see, rather than what the rest of the family want to see – or to see it when we're away from home. This misses the simple point that even TV clips are watched in real time. You can't enjoy them at double speed.

For clip harvesting to make money for TV over the internet, it has to be sold on the basis that you'll download stuff you never watch. Or upload stuff nobody ever watches.

But can real-time TV thrive in that environment? I don't know. Most of Youtube seems to be parasitic on real-time TV. Could it survive on amateur uploads of smartphone video clips? I doubt it. And I'm sure that some Youtube clips will send viewers to the original station, increasing the popularity of successful shows.

But the trick to making more money out of the internet isn't achieved by diverting money from someone else. It has to be a trick that involves creating new things for people to spend time doing, as well as all the things they did before.

Any real-time entertainment will fail to do that unless or until someone finds a way of persuading us to buy lots of things we never use.

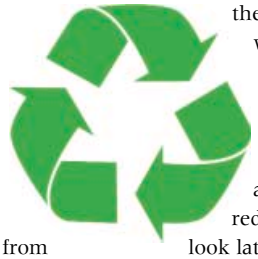
It's worked well for the makers of aircraft lifejackets, so if we can persuade air passengers to subsidise them, it can be done for internet surfers. I just don't think it will be TV that does it. **PCW**

Going, going green

Can we maintain technological progress without destroying the planet? Nigel Whitfield provides some practical advice on reducing the environmental impact of your PC

As we add more and more computers to our homes, with networks, Nas (network-attached storage) devices, streaming multimedia and other gadgets, the amount of power that's used adds up. Then there are the consumables; far from the paperless office, many computer users generate more waste paper than ever before, and of course plastic and metal and chemicals from toner and ink supplies too. Is it worth replacing equipment with 'greener' alternatives, and how do you judge that anyway?

The good news is that, whether your concern is about the bottom line on your electricity bill, or the broader effects on the environment, you can make a difference. And you don't have to drastically change the way you use your computer, replace costly equipment, or take a step back from the information age.



Going green

Climate change is a reality. Most people now realise that, although the academic arguments about the causes won't be resolved any time soon. Thanks to publicity increasing our awareness, including films such as Al Gore's *An Inconvenient Truth*, more of us are trying to think about how we can do our bit to help curb emissions and use energy more efficiently. It's important to realise that it's not just about climate change, it's also about sustainability – making the best use of the finite resources our planet has to offer.

Lots of people do the obvious things first – using local recycling facilities, sorting rubbish, switching to low-energy light bulbs, walking or taking public transport instead of using the car, or remembering to turn the TV off instead of just pressing the standby button.

As a reader of *PCW*, you almost certainly have other ways that you can help too, since you'll have at least one computer – and often many more – at home. You may remember to turn off the television set, but do you do the same with your computer? Even if you do, recent research shows that among younger people, the computer will be used as a source of entertainment more than the TV. In short, power use by computers is increasing, and with it the potential contribution towards emissions of greenhouse gases.

It's not just electricity consumed by our PCs that is an issue. Most people have a printer as well – and a quick look at most ink cartridges is all it takes to see that they're more plastic and metal than ink. You can just throw empty ones away, but it's far better to ensure they're recycled, and preferably by a specialist, rather than just tossed in the local council recycling bin with your empty cereal packets.

Re-use and recycle

The key to green computing, as with other areas of life, is to reduce, re-use and recycle. We'll look later at ways you can reduce consumption, but first it's worth looking at what happens when you've finished with your PC.

As you'll know if you read our recent article 'Our PCs, our planet' (available in eco-friendly electronic format at **www.pcw.co.uk/2162599**), computers contain a number of parts and chemicals that can be dangerous to both people and the environment, and it's important to make sure that they're disposed of properly. That means ensuring if you're just throwing away an old system, you take it to a suitable recycling point. A recent survey in our sister magazine *Computeractive* suggests that's what most people do – but seven per cent of users still put their old computers out with other household waste. Remember that, as some campaigning groups have discovered, when you hand over a computer for recycling, not all of it may be done in an environmentally friendly way, so don't be afraid to ask how your old equipment will be disposed of. We listed some recycling and redistribution organisations for your old PC in the article mentioned above.

Some inkjet printers, such as Canon's Pixma iP4200, can be set to print on both sides of the paper automatically

If your PC is in reasonable condition, it can still be used for web browsing, email and basic tasks, even though it's not up to scratch for the latest games or editing tasks – and around 60 per cent of the *Computeractive* readers surveyed passed their old systems on to friends or relatives, helping to prolong the life of the PC. And you can also, of course, re-use PCs yourself as network file servers, music servers or mail servers on a home network.

But while re-using a computer may be a sound thing to do from the point of view of recycling, remember that you have to balance that against the power use of an older, less efficient system too – something that we'll consider in more detail later.

Consumables are the area where you can make most use of recyling; ensuring that old paper printouts are recycled is a good first step, especially when we so often print out multiple copies of a document, just because of a simple error, such as a misplaced comma. You should try to reduce paper usage by proofing on screen when you can, and look for options in printer drivers that will do

things such as print two or more pages side by side on a single sheet of A4 (known as 'n-up' printing); it may not be OK for the finished document, but it'll help save paper when you're proofing. And if you're in the market for a new printer, why not consider one that can do duplex printing, using both sides of a sheet of paper, without having to reload manually? It's a common feature in business printers, but less so in domestic ones.

You can buy recycled paper, of course, and when you change the toner or ink cartridges, use the manufacturer's recycling scheme, if there is one, or save the empties and drop them in the recycling bins that can be found at many office suppliers. Don't forget that many printers offer an 'Eco' or 'Draft' mode that will use less toner or ink, and should be suitable for many day-to-day printouts. Laser printer owners will often benefit from removing a toner cartridge that is being flagged as 'low toner' and rocking it from side to side. It's not always effective, but it can eke out the remaining toner for a few dozen more pages.

Finally, consider using rewritable media for your backups, whether CD or DVD; unless you're planning to keep a complete audit trail, rewritable discs will allow you to cycle through a few backup sets, instead of creating a pile of old discs that are hard to recycle effectively – and with fewer discs to keep track of, it's easier to secure data too.

Eco computing labels

Recycling consumables and passing on your old computer to someone else is just one part of the equation. There's also the way that you use the computer. By choosing the right system and making the right choices about how it's used, you can have an effect on the power consumption. So, what makes a system energy efficient? To start with, the power consumption of all the components obviously has a major effect on how much electricity is needed, and whether you're upgrading or buying from scratch, choosing the right components can help make a difference (see our feature on page 54 to see how to choose a power supply).

One of the most obvious changes you can make is to replace older analogue CRT monitors with TFT LCD flat-panel models, which consume much less electricity. For example, a typical modern 21in CRT monitor consumes around 130W, while Apple's 20in widescreen display is rated at 65W, or a massive 50 per cent saving. In effect, older monitors can be consuming almost as much power as the computers they're connected to. Unless you have a pressing need (CRTs still have benefits for graphic designers), you really should consider switching – especially now that flat-panel displays are available very cheaply. If you're passing on a computer, consider sending CRT displays for recycling, and encouraging the recipient to obtain a flat panel – even second hand.

When buying fridges, washing machines and other appliances (even cars), you'll have seen the stickers giving an indication of energy efficiency. Many of us now look for the more efficient products automatically. But when it comes to computing, where are the stickers?

In fact, there are two main stickers that can be found on computers and monitors – Energy Star and TCO. The Energy Star logo is supported by the US Environmental Protection Agency, and sets minimum standards for computer equipment; in fact. As the website **www.energystar.gov** makes clear, it can be applied to a whole range of things, including buildings.

Among the key requirements are that systems should enter sleep mode after 30 minutes of inactivity, and that in this mode, there is a limit on the amount of power consumed – roughly 10 per cent of the maximum. Similar standards for monitors currently specify sleep-mode power consumption of less than 4W, and standby consumption of less than two, although new Energy Star standards are being drawn up, which should be even stricter.

It's important to remember, however, that just because equipment is Energy Star compliant, it doesn't have to be used in that way; make sure that your PC's Bios and the Windows Power Management settings are configured correctly – a system with the Energy Star logo can still be set to stay on all the time.

The TCO label is a little more complex than Energy Star; it's from the Swedish Confederation for Professional

Switching from a CRT monitor (left) to an LCD monitor (right) will dramatically cut power consumption ↘

How to offset carbon emissions

Carbon offsetting isn't complicated; it simply means doing something to offset the CO_2 emissions you cause, and the most common way to do that is by planting CO_2-absorbing vegetation such as trees that otherwise wouldn't be planted. There are several organisations that help you work out how many trees you should plant and then plant them in return for a small fee. For example, CO_2 Balance (**www.co2balance.com**) has online calculators for you to use and then you can make an annual or one-off payment for trees that will be planted on its land.

At CO_2 Balance, you can offset your emissions by paying to have trees planted

According to CO_2 Balance, the 65W-power supply for an Apple Powerbook, used 12 hours a day, would consume 71.2kWh of power each quarter, creating 123kg of CO_2 yearly and costing £9 to offset. Other sites give different figures; the National Energy Foundation (**www.nef.org.uk**) suggests 1kWh of electricity usage will create 0.43kg of carbon dioxide, while figures from Strathclyde university (**www.strath.ac.uk**) are more detailed.

Offsetting by planting trees isn't the only solution, though – switching to a renewable electricity supplier effectively means there are no emissions caused by your electrical appliances, and many suppliers now cost the same as those burning exclusively fossil fuels. Comparison sites such as Uswitch (**www.pcw.co.uk/uswitch**) include green suppliers. Ecotricity (**www.ecotricity.co.uk**) and Good Energy (**www.good-energy.co.uk**) are two examples of such suppliers.

Employees, and TCO Development (**www.tcodevelopment.com**) provides labelling standards for office products in general, furniture coverings, mobile phones and computers. The environmental aspect of the scheme deals with power consumption and energy saving as well as recyclability and the use of hazardous substances during manufacture. In addition to environmental issues, the labelling also covers ergonomics and electromagnetic emissions; the intention is to provide an all-round symbol of quality.

There have been several versions of the TCO standards and their requirements are given on the website. However, they're broadly similar to Energy Star, for example a TCO'03 monitor should use four watts or less in sleep mode, and three or less in off or standby mode.

TCO's standards cover ergonomics and recycling, in addition to energy use

There's another standard for green computing, called IEEE 1680; unlike the others we've mentioned, it's not something you'll see on a sticker (yet), but the standard encompasses a range of required and optional criteria, covering areas such as hazardous substances, end-of-life arrangements, and energy consumption. A new US website EPEAT, the Electronic Product Environmental Assessment Tool (**www.epeat.net**), gives details of products that fulfil the requirements. Although it's aimed more at professional and public sector purchasers, it's still useful for individuals who wants to see how various models from major manufacturers such as Apple, HP and Dell stack up.

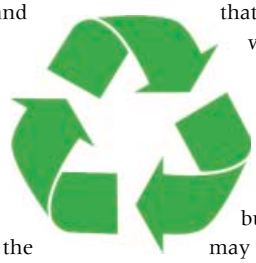
The EPEAT website contains a registry of products that match specific environmental criteria

Standby to save

Standby and hibernate power consumption figures are important. They may seem small (a computer and monitor together may consume only around 5W in hibernate mode) but that still amounts to almost 44kWh each year. Research by Strathclyde University suggests that standby consumption could count for as much as 13 per cent of home power use. Ultimately, the more power consumed, the more emissions of greenhouse gases like CO_2 are generated.

One reason for using these modes, of course, is that Windows simply takes forever to start up from cold. If that's your experience, it's worth checking our recent article on optimising start-up (*PCW*, November 2006 or online at **www.pcw.co.uk/2165594**). With a well-tuned system, shutting down totally may be a more practical solution, and remember that faster start-up is also a promised benefit of Windows Vista. If you can speed up your system start-up and shut down, switching off at the wall socket, instead of on the front of the PC will save you a few extra watts.

Most power is used, of course, when your PC is up and running. Choosing a more modern system with the latest Intel Core-based chips, for example, will use less power than older models, particularly some of the later 'Prescott' Pentium 4 models. If you don't need the highest performance dual graphics cards, it's overkill to opt for a PC that has them fitted. The computer will need a larger power supply to drive them and most PC power supplies aren't as efficient when they're not running almost flat out – which is an important factor to bear in mind if you're building a system from scratch. It may seem like a good idea to fit the largest PSU (power supply unit) you can, in case you upgrade the system later, but if it's under-used, it's not going to use power efficiently, so you may be better off fitting a smaller PSU that's used nearer its full capacity.



You should also think about power issues when upgrading – and not just to make sure you don't overload or underwork your PSU. If you're adding a new hard drive, it may be tempting to keep the old one inside the PC for backing up. But will you be using it all the time? If not, what's the point of having it spinning away inside the box, using power? Put it in an external USB caddy and only plug it in when you want to use it. Conversely, if you have an external drive in a caddy, but find it's used most of the time, consider fitting it inside the PC if you don't really need it to be portable. You're likely to get better performance, as well as perhaps

The latest processors need less power than previous generations

doing away with a power supply and freeing up a USB port. It's also a good idea to check when you're switching on peripherals, particularly printers and scanners; some don't have power switches at all, and are automatically in a standby state, ready to wake up when you send a print job to them. Like PCs, there are obviously small savings to be made by switching off properly, instead of relying on standby, especially if you have a printer that turns itself on when the PC is powered up, rather than when a job is sent to it. Some inkjets are prone to this and, as well as the power consumption, a small amount of ink may be used too, as the nozzles are cleaned on start-up. So if it's convenient, don't plug them in unless they're needed.

'Standby consumption could count for up to 13 per cent of home power use'

Convenience, of course, is what can often scupper the best intentions when it comes to being environmentally friendly. Investing in a power monitor (see box right) will help you work out which peripherals consume most power, and you can decide how to weigh up the convenience of instant start-up against the power consumption. It may even be worth investing a little in new extension cables and sockets; if you can position plugs where they're easily accessed, it's much simpler to remove power from equipment than if it involves scrabbling on the floor under your desk.

Before you press an old PC into service as a file or mail server, check its power consumption too, and consider whether or not you might be better off with a small Nas unit (see our group test in the December issue, or online at **www.pcw.co.uk/2166322**) or something similar – an old PC with its fans and unnecessary graphics cards may be overkill for sharing files and music around the home.

Making choices

With even the most powerful computers taking a fraction of the power that we use daily in our homes, it's easy to question the point of making the effort to save a few paltry watts. It's true that individually we may not be making that much difference, but even small savings add up across the population and, with computers playing such a key part in households, it is possible to make a big difference.

As we've seen, computer users who still have CRT monitors can potentially save most in terms of power consumption by switching to a new, flat-panel screen. In *Computeractive*'s recent survey, just over 25 per cent of respondents had the older displays, potentially almost doubling the power they use when their computer is turned on. Put another way, if those figures are representative of home computer use across the country, and everyone with a CRT could be persuaded to change to an LCD monitor, the amount of electricity used by the millions of home computers and their screens would drop by almost 13 per cent.

Of course, such an immediate huge drop is unlikely, but that doesn't mean we can't all do a little bit without becoming obsessive about it. Whether it's simply changing the settings on our printers to use draft mode, turning over each piece of paper and printing on the back, or remembering to dispose of waste paper, ink and toner sensibly, it's all loose change in the global piggy bank.

You can set your computer to spin down the hard disk when it's not being used, to put the screen to sleep, and choose to shut it down and switch it off, instead of using sleep mode overnight. Or, even better perhaps, have a PC-free weekend now and again.

When you're buying or building a new system, look out for the logos from Energy Star and TCO, or check the EPEAT lists for the systems that are kindest to the environment. Ask suppliers what arrangements they have, or will have, for recycling the equipment when it reaches the end of its life, and help someone else by passing on your old PC, instead of just throwing it away.

Calculate the carbon emissions from your computer's power use, and consider offsetting them through a tree planting scheme, or switching to greener power, which need only take a phone call.

None of these things are complicated. It won't slow down your word processing or web browsing, although you may have to wait a little longer for your PC to start up instead of return from sleep mode. But whether you're keen to save money on your electricity bill or protect the planet, isn't waiting a minute or so a relatively small price to pay? **PCW**

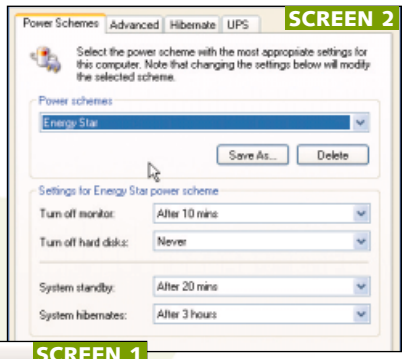
Energy-saving gadgets

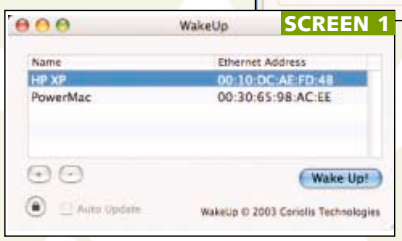
Whether you want to offset your emissions or simply work out which devices are using most power, a good starting point is to know the true consumption figures, rather than assuming that ratings on the back panel are accurate. For around £25 you can buy a PM-30 Power Monitor plug (from **www.taperecorder.co.uk/energy**) which will tell you how much power a device is using. Maplin (**www.maplin.co.uk**) also sells a similar model but with fewer features.

Rationalising your computing equipment may help too. For example, a network print server means that not only can a single printer can be shared, but you don't need to turn on an extra PC to make the printer connected to it available. If you're planning a network, consider routers that include Wifi, instead of a separate router and access point.

You can also help reduce the power consumption on some network equipment by using 'Wake on Lan' functions – so a PC used as a server can go to sleep, for example, and be automatically woken up from other systems on the network using tools like the Magic Packet Sender (**http://magicpacket.free.fr**) (see screen 1).

Finally, don't forget the Power Options control panel in Windows, which will enable you to set the computer to automatically hibernate or return to standby when it's idle for a predetermined length of time (see screen 2).





Above: In Windows Power Options you can configure the energy use of your PC

Left: Wake On Lan lets you remotely wake up a computer from any other

Fix your broadband

Broadband is now almost a utility, but when things go wrong you can't simply call a plumber. Peter Jackson explains stages in the chain and shows how to fix common problems

In the UK, almost all broadband connections are made through ADSL from the local telephone exchange or over cable using the existing cable TV infrastructure. There are a few remote areas where these are not available, and where the only options are satellite or wide-area wireless networks, but for simplicity we'll just be looking at ADSL and cable in this feature.

INTERNET TO MODEM

The most obvious performance measure for these broadband connections to the home is the overall speed of the broadband link, as quoted by the supplier in Kbits/sec or Mbits/sec. But that is only a nominal figure which users should not expect to achieve all the time, and some may not achieve at all. This is partly because of physical circumstances – the distance the user is from the ADSL exchange, for example, or the quality of the cabling into the user's house – and partly because of technical and marketing decisions taken by the broadband provider. These decisions involve things such as the bandwidth of the internet connection installed at the provider's distribution centre, commonly called the backhaul capacity, and the number of simultaneous users expected to share either that connection or the more local link to the distribution centre, usually called the contention ratio.

In an ADSL network, each user is individually connected over the local telephone system to the local exchange, where a unit called a Digital Subscriber Line Access Multiplexer (Dslam) routes the traffic from multiple users into a single asynchronous transfer mode (ATM) link that connects to the wider internet. In most cases all this equipment and traffic is handled by BT, which sells capacity to ISPs to sell on to users; in some cases, though, local loop unbundling (LLU) has meant ISPs can install their own equipment in BT exchanges to route traffic themselves and, hopefully, provide cheaper and faster broadband connections.

The 'asymmetric' in the ADSL term means that the bandwidth of the connection is much higher for data travelling from the Dslam to the user than for data travelling in the opposite direction. A typical link might run at 8Mbits/sec for downloads and only 256Kbits/sec for uploads. This reflects most people's internet usage, but is not ideal for, say, those trying to run their local machines as web servers.

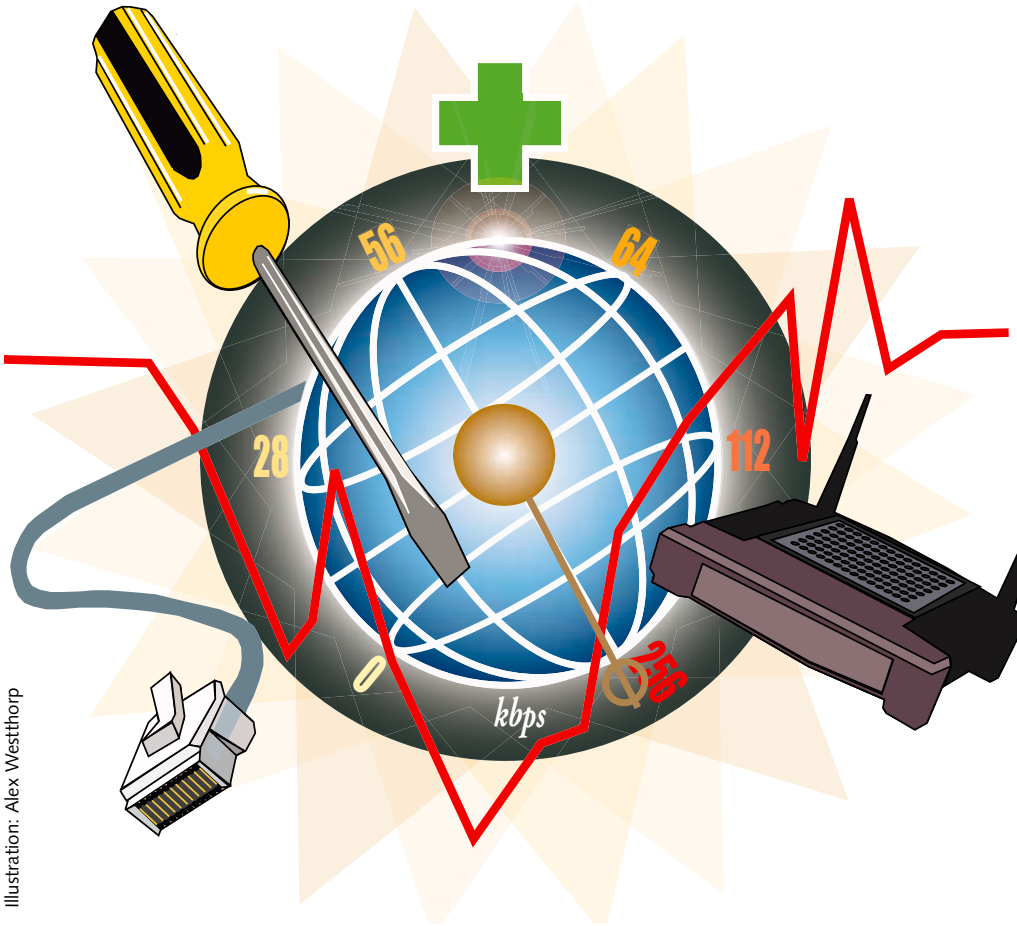


Illustration: Alex Westthorp

Contention ratios

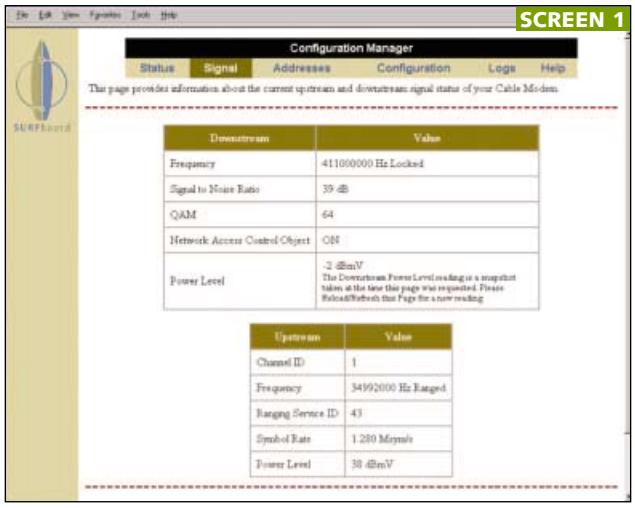
It is only on the other side of the Dslam at the exchange that ADSL contention ratios come into play. The internet backhaul capacity from the exchange to the nearest or most convenient internet point of presence (PoP) is set by BT or the provider handling the equipment at the exchange, and is not often quoted to users. In the early days, the standard BT backhaul bandwidth was 4Mbits/sec for up to 400 home users at 512Kbits/sec, and the company offered a contention ratio of 50:1; in effect, each user was sharing a single 512Kbits/sec connection with up to 49 others. In practice, though, the wider backhaul pipe meant that most users could get their full bandwidth or close to it for most of the time, as internet use is typically 'bursty' and not continuous. It was still possible for greedy users to saturate the connection with large continuous downloads, but they were quickly spotted and warned off.

Today, BT and its resellers do not quote contention ratios. The backhaul capacity provided at each exchange varies depending on the demand and size of the exchange, and can be beefed up if required. However, it's a fair assumption that home users are still faced with a contention ratio of about 50:1, and business users with about 20:1, unless they pay specifically for something better.

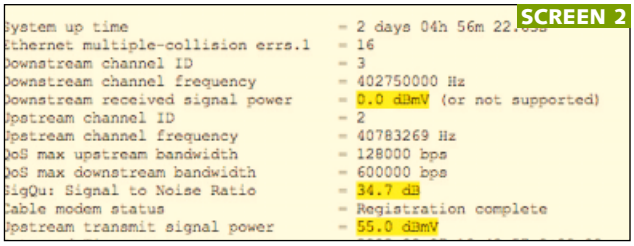
Checking cable modem settings

To check the configuration of a cable modem, plug a PC into its interface socket, launch a browser, and enter the address 192.168.100.1; this is the default IP address for Docsis modems, and should take you to the configuration pages (see screen 1). There should be settings for US or European frequency standards, such as NTSC and Pal – since the channel spacing is 6MHz for the former and 8MHz for the latter – and for the current channel frequency, for example. With some cable modems it is possible to choose a different default upload channel, restart the modem, and see if upload speeds improve; this works because some CMTS units have multiple upload channels, and choosing a different one might help if the default channel is being over-used. However, there is no guarantee that your CMTS will have multiple channels available, or that your new choice will be any better.

The other main settings to check are the signal levels and the signal-to-noise ratios quoted by the modem. If the signals are too weak, or the signal-to-noise ratio too low, throughput can suffer packet loss, continual retries, loss of DHCP-issued IP address, and other bad things. The signal-to-noise ratio should be 30dB or higher,



The cable modem configuration page, called up in a browser at address http://192.168.100.1. Note the download power rating, the signal-to-noise ratio, and the upload channel allocation



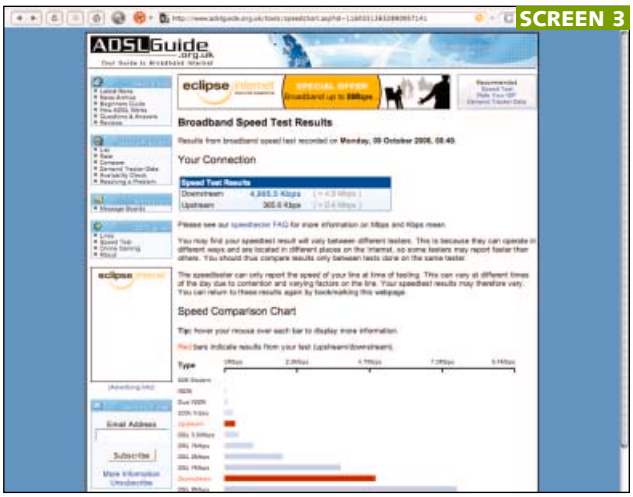
Docsdiag reports the current settings of standard Docsis cable modems

while the received signal power level should be between -15 and +15dBmV; anything outside those limits should be referred to the cable company for advice.

A rather crude but effective piece of software called Docsdiag (see screen 2) can be used to examine the current configuration of a cable modem, although what you do with that information is up to you. This works with most standard Docsis cable modems, although you will need to read the documentation carefully.

But the most significant thing that users can do to check the broadband connections from their suppliers is to make sure that the speed they are getting is the speed they are paying for, or at least something near enough to it (see screen 3).

A typical broadband speed test report from ADSLguide



In cable systems, the contention starts straight away. Broadband users in a cable segment – which can be about 2,000 households – connect over a single cable to a Cable Modem Termination System (CMTS) at the supplier's local distribution centre, and share its bandwidth. That is not such a problem as the cable they share between the local cable hub and the CMTS is a high-capacity fibre-optic one, and the cable between the hub and each house is a high-capacity coaxial type.

The details of these standards, such as MCNS/Docsis in the US and Eurodocsis or DVB/Davic in Europe, are significant for cable companies and their suppliers rather than for users. But they do fix the maximum speed possible per channel between the CMTS and a user's cable modem; in the UK, using Eurodocsis 2.0, this is 54Mbits/sec. Of course, this bandwidth is used by all those on the cable segment, so it might be shared between thousands of simultaneous users. Cable companies manage their systems by capping the connection rate for each cable modem, downloading a configuration file at start-up that fixes the maximum permissible upload and download speeds. This is why they can offer a variety of speeds and upgrade services without having to change cable modems. In all cases, however, the speeds are asymmetric, so a nominal four or 10Mbits/sec cable connection will have an upload speed fixed at a maximum of 384Kbits/sec.

A typical cable modem

Upload saturation

This can cause a problem, because of limitations in the TCP standard that forms part of TCP/IP networking. If the upload bandwidth is saturated – which is quite possible on a cable segment with hundreds of users – the download speed drops to about the same speed as the capped upload speed for all users on the cable segment. The same should apply to ADSL networks, but this does not happen because each user has a dedicated path to the Dslam. This explains why cable companies treat continuous upload use as 'abuse'.

Another capacity limitation is the backhaul bandwidth at the cable distribution centres, which is fixed by the companies and ↘

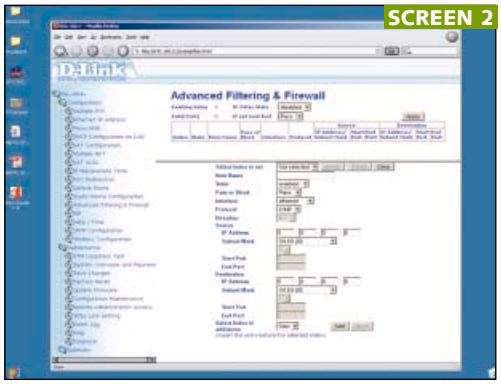
Troubleshooting Nat and Wifi

Standard internet services only work because the router knows about them and has set up something called 'port forwarding' to let traffic through the Network Address Translation (Nat) system unhindered. By default, the router keeps all ports closed apart from things like port 80 for web browsing, port 110 for email, and port 21 for FTP file downloads. These are automatically left open so that any machine on the private network can use these services (see screen 1). This, incidentally, is why you still need to install browser security updates and anti-virus software on each connected machine; the router cannot protect you against threats over these open ports.

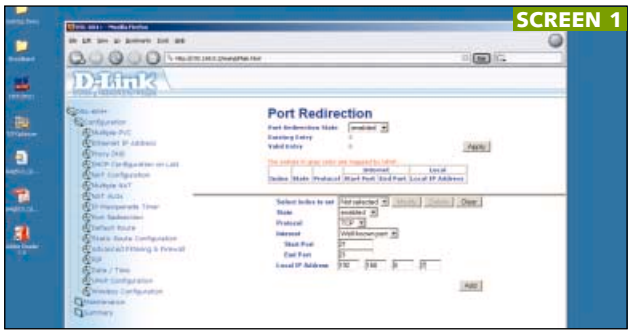
Applications such as online games and some virtual private networks will need other ports to be opened to work properly once a router has been installed, and this has to be done explicitly by the user through the router's configuration pages. Once you've found the right page – it might be called 'port redirection' or 'port forwarding' – all you need to do is enter the application name, the port or range of ports you need to open for that application, and the private IP address of the connected machine for which those ports should be accessible. More advanced port clearing and blocking can be done through the router's firewall configuration (see screen 2).

The simplest solution to Nat or port forwarding problems is to reset the router by turning off the power, waiting for a minute, and then turning it back on. If the problem is with an individual machine, though, you might be able to restore connectivity without disturbing other users by rebooting the PC so that it re-establishes its Ethernet connection and acquires a new private IP address over DHCP. One possible solution to poor wireless network signals is to try a different wireless channel (see screen 3). The 802.11g standard allocates multiple channels within the 2.4GHz band, and picking a different channel can minimise interference from nearby devices such as cordless phones or from other 802.11g networks in wireless range that are using the same channel.

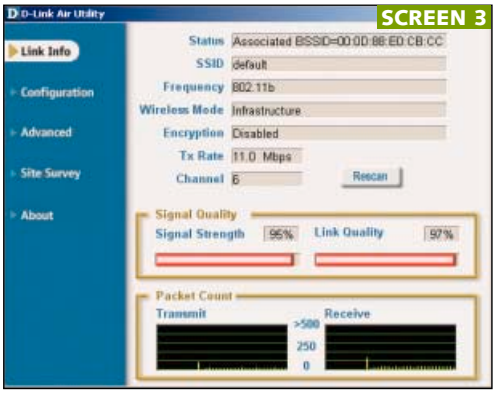
Also ensure your network is secure by choosing a strong encryption standard from those offered by both the router and the wireless network interface. Most modern cards now offer the stronger WPA standard as well as Wep; you should choose the toughest encryption that is supported by both your router and your wireless card.



The router's firewall and filtering functions give full control over ports and packets, and the data allowed through to machines on the private local network



Port redirection, or port forwarding, is set up in the router by allocating a range of ports to open and associating them with an IP address. Here the standard FTP port 21 is being opened for a machine with a local 192.168.x.x IP address



Changing the wireless channel using the wireless network card's configuration utility. Of course, the channel must also be changed in the router for communication to continue

out of the user's vision and control. But as with ADSL, it can be varied by the supplier, according to overall demand.

For ADSL, there is not much you can do to optimise the connection between the exchange and your home. Whether you buy an ADSL modem or take one as part of a bundled deal with a service provider, it will negotiate the maximum possible data rate with the Dslam, establish a connection using point-to-point protocol over ATM (PPPoA) encapsulation, and then transfer the data packets through a suitable interface socket.

Cable connections are different, as here the cable modem is supplied by the cable company and can be regarded as part of the infrastructure. A cable modem will typically have just one interface connector, most often Ethernet but sometimes USB, and is intended for connection to a single PC; any additional equipment you connect will not be supported by the cable company. But the cable modem is effectively an Ethernet bridge, and once a PC is connected to it you can configure some of its characteristics and possibly improve the performance of the connection.

One thing you definitely can't do is 'uncap' the connection speed, although there is a pervasive urban myth that this is possible. The myth arose in pre-Docsis days, when a particular brand of cable modem with particular firmware could be set to bypass the speed cap on a particular cable network. With Docsis, the modem start-up routine contacts the CMTS, which responds with the address of a configuration file. The modem goes to the address, downloads the file with the speed limit settings, the IP addresses other details it needs, applies the settings and authenticates them with the CMTS; only then does it establish communication. The user cannot bypass or affect this process until it is complete.

MODEMS AND ROUTERS

In the simplest case, your broadband connection comes in through a basic ADSL or cable modem and is connected by a cable to a single PC. There does not seem to be much that can be done here, but if you have the choice of an Ethernet or USB connection, choose Ethernet every time. It is more reliable, does not slow down the PC system overall, does not need to be shared with other USB devices such as printers, works automatically on any system, and allows

extra networking and security devices as needs change.

With a single PC connected to a cable or ADSL modem via its Ethernet socket, the modem is effectively acting as a transparent bridge to pass the IP address issued by the ISP on to the PC itself. The ISP's DHCP server allocates an IP address to the connection once communication has been established with the modem, and this address is then applied to the user's PC to make it visible on the internet. That is why it is essential to run security software on a PC connected in this way, as the modem's transparency offers no security at all.

Router security

Security is one reason many users choose to add an Ethernet router between the modem and the PC, even when only a single machine is to be connected, or – for 'wires-only' ADSL – choose to buy a combined modem and router. The router can be thought of as a non-transparent bridge, where the IP address issued by the ISP is applied only to the router, and a private IP address is applied to the PC. In this way only the router is visible to the wider internet, and the PC connected to it is invisible and untouchable. The router can handle more than one PC simultaneously; it gives private IP addresses to any connected PCs and lets them share the single public IP address. Using a standard method called Network Address Translation (Nat), the router sorts out which incoming data packets should go to which machine, and routes them over the right connection.

For the user, this is transparent. Each PC plugged into the router gets its private IP address – usually in the standard range 192.168.x.x – from a DHCP server in the router itself, and automatically picks up a Domain Name Server (DNS) address. Any PC that works when it's plugged into a broadband modem directly will work without any hardware and software changes when it's plugged into a router instead; only its apparent IP address will change, to one in the 192.168.x.x or 10.x.x.x ranges reserved for private networks.

One problem that cable modem users may face is Media Access Control (MAC) registration. The MAC address is a unique identifier for every Ethernet device, and is hardwired into the hardware; your cable company may need to be notified of the MAC address belonging to the PC you are connecting to the cable modem, or might automatically pick up its MAC address the first time you connect. If you add a router between this PC and the modem, its MAC address will also need registration before it can work. You can register the router's MAC address at the ISP's website, but many routers allow you to bypass this procedure by simply giving it the same MAC address as the PC that was originally connected, and is therefore already registered.

As with all other router settings, this is controlled through a web interface built into the router. Launch a browser, enter the private address – its exact form will be in the router manual – and you will reach the configuration pages. This may not be necessary as router installation programs often give you the option to clone the MAC address of the PC when you first set up the router.

A wireless access point is just another kind of Ethernet bridge, transferring data packets from point to point over the network using radio signals rather than signals in a twisted-pair cable. The standard to look for is 802.11, often called Wifi, which comes in various speed variants. The original was 80.2.11b, which runs at 11Mbits/sec; the most popular now is 802.11g at 54Mbits/sec, and some manufacturers are offering high-end units meeting the draft 802.11n specification at 540Mbits/sec. On top of that, individual manufacturers have their own high-speed specifications based on 802.11g, offering double the data rate, say, as long as you use their hardware. The safest choice is still 802.11g, which guarantees interoperability between hardware from the widest possible range of makers and will also work with older equipment.

'One thing you definitely can't do is uncap the connection speed'

Throughput hints

It's worth talking here about network speeds and their overall impact on throughput. The key point to remember is that broadband traffic comes in packets, and that the thing to avoid is a queue of undelivered packets building up at a bottleneck anywhere in the system that is under your control. For example, an 8Mbits/sec broadband connection might be presented at the modem through a 10Mbits/sec Ethernet port. This is then plugged into a 100Mbits/sec Ethernet port on a router, which then connects over a 54Mbits/sec 802.11g wireless link to a PC.

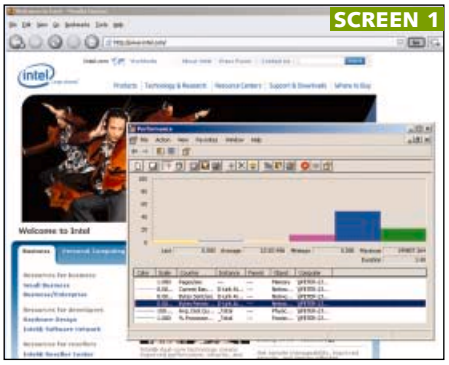
All this seems fine, as the broadband link is the slowest in the chain, and everything else is faster. The other connections will be waiting for packets and then sending them as fast as they can. Besides, there might be four PCs sharing the 8Mbits/sec link, meaning that only a maximum of 2Mbits/sec is required for each Ethernet connection. But things are not quite so clear cut.

No network runs at its maximum rated speed for any individual point-to-point connection; there are always overheads that slow things down, dropped packets that need to be retransmitted, and network latencies. For example, an 802.11g network's real-life throughput is only about half its maximum 54Mbits/sec rating. It's always good practice to over-specify at each link in the network if you can, and provide as much clear bandwidth as possible. And that's particularly true as broadband speeds are increased.

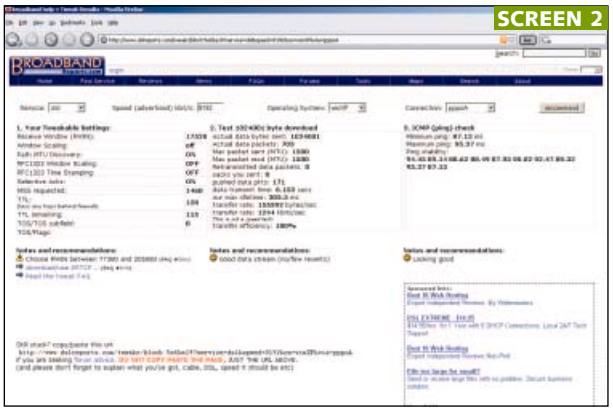
Wireless networks are easy to set up and use, and most problems arise because of signal, strength and security. An 802.11g network works at a frequency of 2.4GHz – the same as thome. The positioning of the access point and its aerials can be crucial to getting the coverage you want, and there may be hotspots and dead spots in particular rooms or positions. The effect of low signal strength is low throughput, as many packets will need to be retransmitted to make sure they get through the unreliable link, and the signal strength should be checked first if wireless performance is disappointing at particular points in the house.

TCP optimisations

The trouble with online speed tests is that the internet does not involve fixed links from point to point, and the networks and servers have to respond to numbers of simultaneous users making varying requests for data. The route that packets take between any two points can vary depending on network loads, and so introduce different delays for identical requests. However, you can monitor the speed at which data is being sent and received over your network adapter and so over your broadband link using the built-in Performance Monitor in Windows XP. Run the Monitor and check the Network Interface option (see screen 1).



Windows XP's Performance Monitor lets you watch network activity through the TCP/IP network adapter and can log results over time

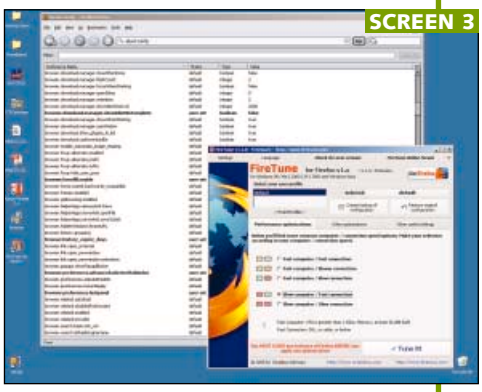


The DSLreports 'tweak test' examines your broadband connection and suggests more optimal settings for such things as RWin and MTU

The two Windows settings that might make a difference to performance are the TCP Receive Window (RWin) size and the Maximum Transmission Unit (MTU) size. The first sets the maximum amount of data that can be received before the sender requires an acknowledgement that a packet has successfully been sent. If RWin is too low, then only a few packets can arrive before an acknowledgement signal must be sent, and over a long-latency network like ADSL or cable this can cause a break in sending data. Increasing RWin so that more packets can be sent in one block means that there are fewer acknowledgement delays, although making it too large means that if there is an error all the packets in that large window must be resent, losing earlier speed gains. MTU is the maximum size of each data packet, and for Ethernet this is a maximum of 1,500 bytes; however, for ADSL in the UK BT recommends that the setting should be 1,458.

These settings are assigned in the Windows Registry, and the easiest way to change them is by running a free utility such as DrTCP or TCPOptimizer after running the Java-based 'tweak test' at **www.dslreports.com/tweaks** (see screen 2) and checking its recommendations. The changes may not make any difference, and may make things worse; the only way is to try them and see if downloads are any faster than they were before.

There are marginal tweaks for all web browsers, particularly the extremely configurable Firefox, and those interested in optimising Firefox performance should look at the Firetune utility at **www.pcw.co.uk/2135450** (see screen 3). This automates the setting of many Firefox parameters to match your machine type, connection speed and pattern of Internet use.



Firetune offers a shortcut to optimising the Firefox browser. The rear window shows some of the scores of configuration options in the Firefox About:Config display

Better coverage can be obtained using new wireless technology, particularly the Multiple Input Multiple Output (Mimo) extension to 802.11g. This uses 'smart' antennas to extend wireless range and throughput, and many manufacturers now offer Mimo routers alongside their standard models. You will now also see 'draft N' routers on the market, which meet the unratified draft 802.11n standard and again promise better coverage using Mimo techniques and much faster throughput. Either of these options can work well to overcome wireless 'dead spots' in the home.

Encryption

Wireless security is essential, as without it any PC within range could steal your internet bandwidth and, potentially, monitor your private traffic. The original security standard was Wired Equivalent Privacy (Wep), which was part of 802.11b, although now the sterner Wifi Protected Access (WPA) standard is more common. Both require you to enter a code at the access point and at every connected PC, and no machine without that code can connect to the network. There are various sources of possible trouble here. One is that there are various levels of security in both Wep and WPA, using different lengths of hexadecimal digits, words and phrases, and if you choose different levels at different points in the network, they will not talk to each other. It's worth being particularly rigorous about settings, writing everything down, and typing very carefully. In particular, it's galling to connect wirelessly to a router/access point, change its security setting, and then find that the settings you enter on the PC don't work. The only solution then is to connect the PC to the router via an Ethernet cable, and put things right from there.

THE PC END

The purpose of any broadband connection is to deliver information and provide services to the user on the PC screen. And once the connection has been made, the PC is the tool used to monitor, optimise and generally make the most of the broadband opportunity.

The first stage is connection. Although most connected machines will be PCs, Macintosh, Linux or any other sort of system can be used alongside or instead of PCs in any broadband-sharing network. The Ethernet packets are not hardware or operating system-specific, and can be universally understood.

Most modern desktop and notebook PCs will come with a 10/100Mbits/sec Ethernet ↘

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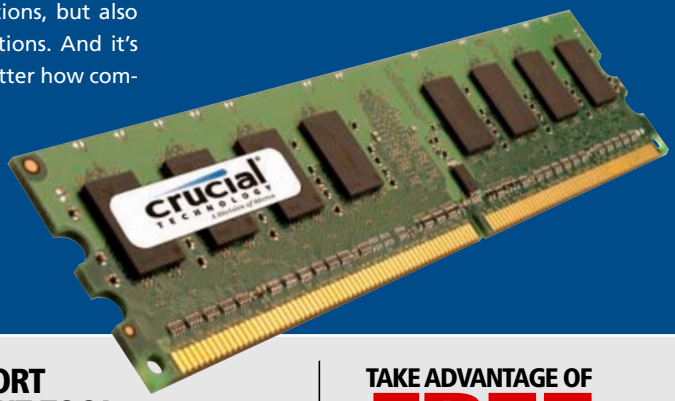

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port as standard, and connecting this to a router just involves plugging in the appropriate cable. Connections from PC to router use straight-through cable, as do most connections from router to modem, while direct PC-to-PC links require a crossover cable, where the transmit and receive pins are exchanged at the different ends. However, you should check the modem and router manuals to make sure that you use the right cables and plug them into the right sockets. As a cable modem is a transparent bridge, its output should go into the Wan port of the router, while the PC cable should go into one of the Lan ports. In an ADSL system the router's Wan port will connect directly to the telephone socket, and the PC cable to a wired Lan port as before.

Once the cables are connected, the connection rate is automatically negotiated between the Ethernet ports, so that if you plug a cable from a 10/100Mbits/sec socket into a 10Mbits/sec socket on a cable modem, say, the system will automatically set itself to work at the lower speed. One problem some users may notice is that this can go wrong with certain models of cable modem, so that the half-duplex port on the modem is wrongly recognised as a full-duplex one. This results in the PC Ethernet interface being set up wrongly, and the efficiency of the Ethernet interface drops dramatically because of multiplying packet collisions and resends. However, this is unlikely to happen in modern setups, or when a router is placed between PC and modem.

For wireless connections, you will need a PCI or USB wireless interface for desktop machines, and a PC Card wireless interface for notebook PCs that do not come with 802.11g built in. Configuring these cards is usually straightforward, although there can be some confusion when the interface manufacturer's software tries to take over from Microsoft's built-in wireless configuration routines in Windows XP. This can lead to users not being able to find the configuration settings, as it just produces a message saying that 'Windows cannot configure this wireless connection'. In this case you need to find the manufacturer's own configuration utility and use that.

If a wireless card is within range of one or more access points, choose the right wireless network from the list, enter the security code, and click the Connect button. Then, once connection has been made, the channel, signal strength and other status indicator are made available.

At this point, you should be able to use the browser, email and other standard internet tools over your broadband connection. But what do you do if you can't?

There's a logical sequence of steps to try. First, check the hardware and the physical connections; are the modem and router switched on and showing the appropriate indicator lights, and are all the cables firmly plugged into the right sockets? For wireless networks, is the signal strength good enough, and is the configuration and status utility showing an established connection? In Windows XP, the Network Connections control panel allows you to check that your broadband connection, whether Ethernet or wireless, has been successful.

Finding the current IP address is easily done by opening Network Connections, selecting your broadband connection, and looking at the bottom of the info pane on the left. Here the 192.168.x.x address shows that the PC is connected to a router through Nat

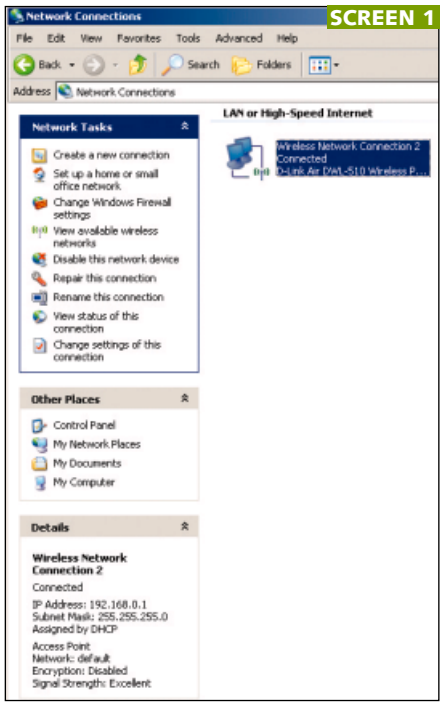
Address allocations

Next, check the IP address that your PC currently has. In Windows XP, you can do this through Network Connections. If you right-click the broadband connection in the panel and choose Properties, and then the Support tab, the PC's IP address will be displayed. Alternatively, selecting the connection and scrolling down the left-hand pane of the window will show the current IP address at the bottom (see screen 1).

This address will generally have one of five values. If the PC is connected directly to a working ADSL modem or cable modem with a working broadband connection, then it will be the public IP address assigned by the ISP to the modem and hence to your machine. The address depends on the ranges assigned to the ISP for distribution. If the PC is connected to a working router, then the address will be the private IP address assigned by the router's DHCP server, and will be in the 192.168.x.x or 10.x.x.x range. If it's connected to a working cable modem, but with no cable connection, then the address will have the form 192.168.100.x; this is issued by DHCP in the cable modem so that the PC can at least reach the configuration pages on 192.168.100.1.

'As a rule, power up in the order modem; router; PC'

If the PC could not pick up an IP address from DHCP at the ISP or at the router, then the address will have the form 169.254.x.x, as an automatically assigned private address provided by Windows. And if the address is 0.0.0.0 then the Ethernet network is not working, the Windows DHCP client is not working, the automatic private IP address routine is disabled, or any combination of these things.



The internet connection will work in only the first two cases, and if the cables and hardware seem to be operational, then you should try to force the PC to acquire a new IP address. This can be done by rebooting the PC, but a quicker way is to open a Command Prompt window and type `IPCONFIG /RENEW` This command will try to acquire a new IP address from the DHCP server, either at the router or the ISP. It may solve the problem if it was simply a glitch, or if you turned on the PC and the cable modem, say, at the same time and the PC booted before the modem was ready. In this case the boot sequence might be complete, and the private 169.254.x.x address assigned, before the public IP address from the ISP was accessible. As a rule, power up in the order modem; router; PC, and let each one run through its diagnostics before turning on the next.

If you have a 192.168.x.x. address from the router but still have no internet access, the cause may be a lost connection between the router and the ISP. Even without an internet connection, you can access the router or cable modem's configuration pages in the normal way and check the status of the ISP connection. For example, in some cases an ADSL connection could have been dropped by a glitch in the phone line or at the exchange, and the modem's automatic reconnect routines could have failed. Checking the account name and password entered in the modem or Wan section of the configuration pages, and clicking the Connect button, can solve problems like this quickly, although you may prefer to reboot the modem and see if it comes back up with a proper connection. **PCW**

Understanding PC power supplies

Paul Monckton and Simon Crisp take you on a tour of a vital, but widely ignored, component of your PC

Power supplies may use fairly basic technology, but they're vital for your PC's reliability. This picture shows what a typical PSU looks like inside

Many of us upgrade our PCs regularly: we want faster processors, dual graphics cards and Raid systems. New power supplies though? To most of us they're just not sexy, but you overlook the PSU at your peril.

In the body of your PC, if the CPU is the brain then the PSU is certainly the heart. Often overlooked, a 'dicky ticker' can be the cause of many computer problems, from baffling and seemingly random crashes through to sudden deaths, accompanied by loud explosions.

And as well as increased system stability, a decent PSU may bring quiet or silent operation, better overclocking and more capacity for upgrades.

Why a new power supply?

If you like to keep your PC up to date, you'll know very well how much of a boost to performance there can be from new graphics cards and dual-core CPUs. With these upgrades consuming so much of your hard-earned cash, it's easy to overlook the increasing demands these products may make on your power supply.

It's true that in many cases newer products are designed to consume less energy than their predecessors, but an upgrade in performance within any given technology will usually result in increased power demands. You can't just take it for granted that your power supply will cope with the extra load, or even come with the requisite number of connectors.

TABLE 2

Component power needs

	POWER REQUIRED (WATTS)
CPU	65-300
Hard drive	10-15
High-end graphics card	up to 140 per card
Optical drive	5-10
Ram per Dimm	5-10

As PCs have evolved, so have PC power supplies. Modern motherboards, graphics cards and hard drives require different PSUs to older ones; in fact, if you're upgrading a motherboard you may have no choice but to buy a new power supply, as the old one may not have the right connectors. And even if you do have one with the right connectors, it may not be up to the job; the box on the next page explains how you can perform some basic tests. When choosing a new power supply there are some key things that you need to consider:

- The total available power
- The power available to individual components
- The number and type of available power connectors
- The amount of noise generated by the power supply
- The efficiency of the power supply (if you care about the environment or your electricity bills)
- The cost of the power supply itself.

Estimate your power requirements

With so many different components available to anyone building a PC, an exhaustive list of component power needs is virtually impossible to put together; finding out the details usually involves rifling through product data sheets and even then it's rare to find a straight answer to the question, 'How much power does this component need?' However, one thing's very clear – the two biggest consumers of PC power are CPUs and graphics cards.

CPUs

Intel and AMD don't quote power consumption figures directly. Instead, they quote the processors' Thermal Design Power or TDP, and to make matters worse, they don't calculate these figures in the same way.

TDP is a measure of how much heat the processor will dissipate under load. This is intended to help you to specify the correct cooling system for your CPU. While AMD tends to quote a figure based on the maximum current the processor can actually draw, Intel's estimates are more conservative.

Typical TDP specifications range from about 62W for an AMD Sempron to over 130W for a dual-core Pentium Extreme Edition, based on the Prescott core. Overclocked CPUs can require well over 300W. You can find detailed processor specifications at Intel's and AMD's support websites (**http://processorfinder.intel.com** for Intel and **www.amd.com/us-en/Processors/TechnicalResources** for AMD).

Graphics cards

Some graphics cards, such as Nvidia's workstation Quadro range, quote power consumption figures explicitly. These range from 105W to 136W per card. Obviously, you'll need to double up if you're using a dual-card system.

Nvidia and ATI also certify power supplies for use with dual-GPU SLI and Crossfire systems. Details are available at **www.slizone.com/object/slizone2_build.html** and **www.ati.com/technology/crossfire/Certified.html**.

Sample power supply specs

TABLE 1

Model	TG480-U22						
AC input	100-240VAC 10/6A 60/50Hz						
DC output	+3.3V	+5V	$+12V_1$	$+12V_2$	-12V	-5V	+5VSB
Max output current	28A	48A	20A	20A	1.0A	0.8A	2.5A
			30A				
Max combined power	240W		360W		12W	4W	12.5W
	460W				28W		
Total power	480W						

What do the specs and tests mean?

Once you have an idea of the needs of your components, you need to find a PSU that matches them. All PC power supplies carry a rating, in watts. The obvious conclusion to draw as a consumer is that the greater the wattage, the more powerful the power supply and the more components inside your PC it will power. But, while this is a good rule of thumb, it's far from the whole story.

Most decent modern PC PSUs come with a rather confusing table of numbers similar to table 1. The quoted wattage of the PSU is given by the 'Total power' figure at the bottom of the table, but above that are various other power outputs which are also crucial to the smooth running of your PC.

As you can see from our example power supply, the manufacturer has been quite explicit about the maximum power that can be delivered on various power 'rails' – individual power circuits – at the same time. But some power supplies try to hide, or omit entirely, these combined power limits when describing their capabilities.

For direct current (DC) circuits, power in watts is calculated simply by multiplying volts by amps. In our example, simply totalling up the maximum power available to each rail would have produced a much higher, and completely misleading, total power output of 840.9W. So, looking at a single power figure in watts simply isn't enough to tell you if the PSU is going to be adequate for your needs.

A modern power supply, meeting one of the ATX specifications, will supply multiple rails, each carrying the different voltages required by different parts of your PC. These are typically 3.3V, 5V and 12V. Different components have different power requirements and may make different demands on some or all of the available rails.

Hard drives, modern CPUs, optical drives and PCI Express graphics cards all use the 12V supply. Many high-end PSUs come with multiple, discrete 12V rails, which allow you to distribute power evenly between all these components. An additional 5V standby rail is also provided to enable some devices to receive power even when your PC is turned 'off'. This enables functions such as your front power switch to work when you turn on the PC.

Efficiency

Usually specified as a percentage, a PSU's efficiency determines the proportion of power consumed by the PSU that is converted into useful power in the PC. A PSU with an efficiency of 90 per cent that consumes 500W of power will provide 450W to the PC. The 'missing' 50W of power is wasted, mainly as heat, which must be removed by fans or other cooling systems.

The efficiency of a power supply will often decrease alongside the load placed upon it, so a PSU going flat out to feed a fully loaded system may perform more efficiently than

Checking your PSU's performance

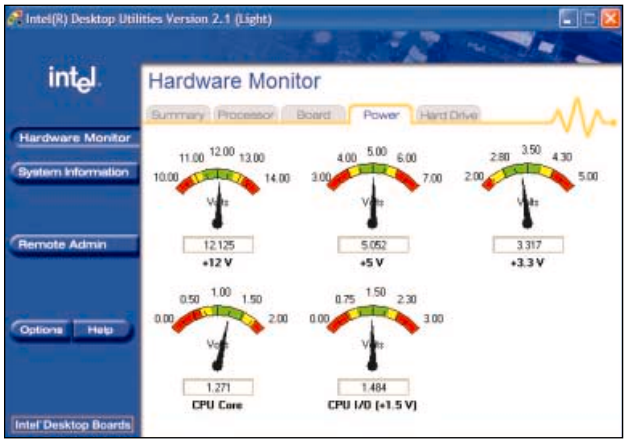
If you're having problems with your PC, especially unexpected shutdowns or heat issues after installing new hardware, then your PSU is a likely culprit. What is more, PSUs that are straining to support your PC may under-power components, leading to instability; they can shut themselves down or even explode!

Conducting a comprehensive test of a power supply is an involved process requiring specialist equipment. The good news is that in this feature we've tested a selection for you, so you can see just what's involved (see overleaf). The bad news is that testing your own PSU is very tricky. However, if you suspect your power supply may be causing problems, there are a number of steps you can take. Modern motherboards monitor the voltages on each of the power rails and report the results to the Bios. You can read these details using a software utility and see if your system voltages are within spec.

These results will often look fine when the PC is idle, but stressing the system's components simultaneously will place the PSU under a much higher load. You may find voltages drop significantly under load, a sure sign that your PSU isn't up to the job.

Many modern motherboards come with monitoring software included and using this while running intensive tasks such as 3D games and disk defragmenters will show you the voltages your power supply is delivering while the PC's components are running flat out.

If no monitoring software was provided, then free third-party utilities are also available. For motherboards manufactured before June 2004, Motherboard Monitor can be downloaded from **http://mbm.livewiredev.com**. Unfortunately, this software requires specific code for each type of hardware monitor chip used and development has now been discontinued.



Intel's Desktop Utilities software works with its own motherboards and provides, among other things, voltage readouts from the board's built-in sensors. If any of these readings stray outside acceptable limits, your PSU could be the root of your problems

A good alternative to Motherboard Monitor is Speedfan, available at **www.almico.com**. While its display isn't as easy to read as the dashboard of Motherboard Monitor, it's easier to set up, thanks to its built-in auto detection methods.

Neither of these utilities is for novice users, however. When misused, they can manipulate your hardware in ways that could make your problems worse, damaging your PC or even yourself. We recommend sticking to your manufacturer's supplied utilities wherever possible and keeping well away from power supplies in general, unless you know exactly what you're doing.

↘

when fuelling a less power-hungry PC. You should look for a PSU with a rated efficiency of 80 per cent and above; for example, the Galaxy range from Enermax offers 80-85 per cent efficiency from 20-100 per cent of load.

Many PSUs come without efficiency specifications – don't be surprised to discover that these can be very inefficient. In our tests, we found efficiencies as low as 46 per cent, which could mean wasting over 500W of power under full load.

Noise and cooling

Almost paradoxically the PSU, while generating heat, also plays a major role in cooling the interior of your PC case. Often fitted with multiple fans, the PSU draws air through the PC case and blows it out the back. In so doing, the PSU cools both itself and the other components.

Fans are the major cause of noise coming from your PC, and many PSUs are designed to minimise the noise produced by selecting quiet fans and running them only as fast as is necessary to keep the system at a pre-determined temperature. As the temperature rises, so will the fan speed and the noise.

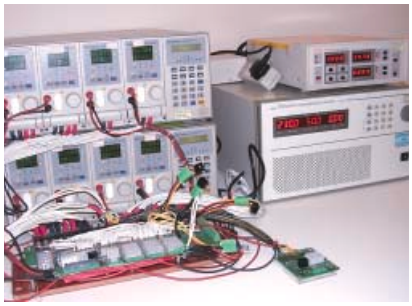
If the PSU is efficient enough, it may be able to stop the fan entirely, relying only on its own internal heatsinks under lighter loads. Such power supplies are known as 'semi-fanless' and will reduce PSU noise virtually to zero under most conditions. Cheaper models may have user-selectable fan speeds or no fan speed control at all. Even if you're not concerned about running a 'silent' PC, it's well worth looking for a low-noise power supply, as the differences in noise output can be huge.

Whether you're upgrading a PC, building a system from scratch, or just trying to get to the bottom of mystery crashes, remember the power supply may just look like a boring box in the corner of your PC's case, but it's one of the most important components in there. **PCW**

Real-world PSU testing

We took a range of power supplies comprising the latest 1,000W models, some popular branded current models and some older units. We also included a couple that come pre-installed in cases.

To test the supplies we stress tested them at the manufacturer's quoted output with a 100 per cent load for an hour (in some cases, due to some very unpleasant smells coming from the PSUs, the tests didn't last as long). This was to isolate any weakness in the units including rail stability, heat generation, noise, or internal components starting to fail, any one of which might cause failures when installed in a system.



To test the PSUs, we used a Chroma 6314 system loaned by Enermax

During testing a number of supplies had failures with the 3.3V and 5V rails, although it's unlikely that in normal use these rails would get so stressed. The same cannot be said about 12V rail failures. Failures from 12V rails producing voltages under the 12V ATX specifications could cause systems to freeze or crash, while 12V rails producing voltages over the specifications are likely to cause more serious damage to system components.

Testing equipment

To test the PSUs, we were kindly granted access by Enermax UK to a Chroma 6314 power supply tester (see picture). This testing unit enables each of the PSU's power rails (3.3V, 5V, 12V, -12V and 5V Standby) to be individually stress tested. Supplying the AC input was a Chroma 6430 Programmable AC source. To measure the amount of power input to the PSUs a Zentech 2100 Digital Power Meter was used.

See the table below for rail rating test results and **www.pcw.co.uk/2166416** for efficiency test results.

Rail rating tests

	3.3V	5V	$12V_1$	$12V_2$	$12V_3$	$12V_4$	$12V_5$	-12V	5V STANDBY	ATX SPECIFICATION PASS/FAIL
ATX 2.0 spec (min/max)	**3.14/3.47**	**4.75/5.25**	**11.4/12.6**	**11.4/12.6**	**11.4/12.6**	**11.4/12.6**	**11.4/12.6**	**-10.8/-13.2**	**4.75/5.25**	
AC Ryan Ryanpower2 450	3.08	4.94	11.98	N/A	N/A	N/A	N/A	-12.36	4.95	FAIL
Antec True Control 550	2.69	4.13	11.29	N/A	N/A	N/A	N/A	-12.09	4.89	FAIL
Antec True Power Trio	3.13	4.80	11.97	11.99	12.14	N/A	N/A	-11.50	4.83	FAIL
Be Quiet BQT ES-700	3.11	4.62	12.32	12.39	12.41	12.40	N/A	-12.70	4.77	FAIL
Enermax EG285SX-vB(G)	3.29	4.86	12.35	N/A	N/A	N/A	N/A	-12.22	4.98	PASS
Enermax Galaxy 1000	3.18	4.87	11.90	11.90	12.10	12.01	12.01	-12.20	4.81	PASS
Enermax Galaxy 850	3.28	4.94	11.92	11.92	12.23	12.17	12.17	-12.22	4.86	PASS
Enermax Liberty 620	3.22	4.92	11.83	11.98	N/A	N/A	N/A	-12.18	4.86	PASS
FSB Epsilon FX700-GLN	3.20	4.67	12.18	12.29	12.23	12.28	N/A	-12.30	4.94	FAIL
FSP Greenpower 400	3.23	4.76	12.16	12.15	N/A	N/A	N/A	-11.42	4.87	PASS
HEC PowerOP 475	3.18	4.33	11.25	N/A	N/A	N/A	N/A	-11.58	4.82	FAIL
Hiper SF-520TS	3.26	4.79	12.65	N/A	N/A	N/A	N/A	-12.65	2.95	FAIL
Mercury KOB AP4400XA	Failed at 400W, 350W blew up at 323W after 3 minutes									
OCZ GameXStream 700	3.23	4.74	12.23	12.22	12.26	12.22	N/A	-12.51	4.88	FAIL
RaptoxX RT-550W 2.0	3.26	4.89	11.91	12.00	N/A	N/A	N/A	-12.82	4.87	PASS
Seasonic S12 600	3.18	4.86	11.85	11.93	N/A	N/A	N/A	-11.93	5.00	PASS
Tagan 1100	3.37	5.08	12.04	12.20	12.12	12.16	N/A	-12.70	4.82	PASS
Tagan 900	3.16	4.93	12.13	12.13	12.05	12.20	N/A	-12.64	4.77	PASS

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Have a very techie Christmas

Christmas is coming and, as Cliff Joseph discovers, there are some weird and wonderful gifts to fill your Xmas stockings. We've gift ideas from £5 to £600, so no matter what the size of your wallet, there should be something suitable

Nextbase SDV1102
£349.99
Voyager Systems www.voyager-systems.co.uk

There are quite a few portable DVD players around, but the mains and car-powered Nextbase SDV1102 is one of the nicest we've seen. It's got a huge 10.2in widescreen (800x480) TFT display that provides good image quality, and its slimline tablet design is easy to carry and hold while watching movies. It also incorporates stereo speakers, an SD card slot, USB port and both Freeview and analogue TV tuners, making this an outstanding portable entertainment system.

M-Audio Keystation 61ES
£129.99
The Apple Store
www.apple.com/uk/thestore

Computers work well these days with the latest digital musical instruments, such as M-Audio's Keystation keyboards. The Keystation 61ES is a USB keyboard that will work with any Mac or PC music software. It has 61 velocity-sensitive keys that feel just like the keys on an ordinary keyboard and can adjust the volume of their sound depending on the pressure you use to hit the keys. For complete beginners there's a smaller 49-key model priced at £70.

Lego Mindstorms NXT
£179.99
Lego http://shop.lego.com

The perfect 'boy's toy' for anyone aged from 10 to about 110. The latest version of the Mindstorms kit includes instructions for 18 types of robot, and Lego says you should be able to build your first robot in about half an hour. The kits are based around Lego's 'intelligent brick', which is equipped with its own 32-bit ARM7 Risc processor and memory, and can be programmed on a PC or Mac. The instructions can be downloaded via the USB cable connection.

Epson EMP-TW20
£500
Dabs www.dabs.com

Sales of flat-panel TVs are soaring, but they're still pretty expensive. One alternative is to buy a good projector. We're fans of Epson projectors, and the EMP-TW20 Home Cinema Projector is a great choice for watching DVDs at home. The image is bright and colourful and it has a good 'throw ratio' – which means you can get an image 80in wide with the projector just 6-7ft away from the screen or wall.

Logik LCXW32HDI
£599
PC World/Currys
www.pcworld.co.uk

There are currently some good deals on flat-panel LCD TVs, and one of the best we've seen is this 32in model on sale at Currys and PC World. Admittedly, Logik isn't a well-known brand name, but the image quality is still pretty good. Also the LCXW32HDI is HD-Ready, which means it's a great deal for those with a satellite or cable HDTV subscription, or if you're planning to invest in one soon.

3-Inch Handheld Freeview TV
£179.99
Maplin www.maplin.co.uk

If you're a news or sports junkie you might want to grab one of Maplin's tiny Freeview TV sets. The set has a 3in TFT LCD screen and built-in Freeview TV tuner, as well as an extendable aerial to pick up a digital signal. It's even got an (analogue) radio receiver built in. The rechargeable battery lasts for about three hours, and the set includes a power adapter for charging it in a car.

Philips Digital Photo Display
£129.99
Philips www.philips.co.uk

We've seen a few of these 'digital photo frames' before (starting with Sony's in 1999), but this model from Philips is one of the better ones. The display has a 720x480 resolution screen that is about the same size as a 6x4in postcard, and allows you to browse individual photos or play them as a slideshow. You can transfer photos onto it using most types of memory card, and it has enough built-in memory to store about 50 photos.

Ion USB Turntable
£119.95
Firebox www.firebox.com

It's a little on the pricey side, but this full-size, dual-speed, belt drive USB turntable is one of the easiest ways to convert old vinyl singles and albums into digital recordings. Just plug it into a spare USB port and then put a record onto the turntable. The Audacity software supplied with the turntable works with both Macs and PCs and will record your LPs or singles onto a hard disk as you play them, and convert them to various popular digital audio formats.

Oregon Scientific Smart Globe
£89.99
Oregon Scientific www.oregonscientific.co.uk

Oregon's Smart Globe puts a new spin on this traditional educational tool. It is supplied with a wireless smartpen that you can use to point at any country on the globe. The console on the base of the unit then provides all sorts of information about that country, such as population statistics, displaying its flag, or playing the national anthem. You can even connect the Smart Globe to the internet and download the latest news updates from around the world.

Garmin Etrex Camo
£88
Garmin www.garmin.com

There are plenty of in-car GPS satellite navigation systems around, but Garmin's Etrex is designed for sporty types who actually like to use their legs occasionally. It's a 12-channel GPS system with a compact design that can be held and controlled with just one hand, or easily slipped into a jacket pocket. You can plan a route with up to 500 waypoints, and there's a trackback feature to help you retrace your steps if you get lost.

Harmony Universal Remote
£69.99-£299.99
Logitech www.logitech.co.uk

Remote control overload is the bane of the digital age. Logitech's Harmony range takes an ingenious approach to creating a universal remote control – a device that can control multiple devices such as a TV, DVD player and music system. Go to the Harmony website and enter the name and model number of the devices you want to use. The website will program the Harmony for you, downloading the necessary info via the USB port. Infra-red and wireless models are available.

Nintendo DS Lite
£99.99
Nintendo www.nintendo.co.uk

The Nintendo Wii (see page 76 and **www.pcw.co.uk/2166447**) and Sony Playstation 3 consoles are on the horizon, but both have yet to live up to their hype. We still think the Nintendo DS Lite (a lighter, sleeker version of the original DS) is one of the most innovative gaming gadgets released in years. Its twin-screen design and wireless connectivity have given rise to some imaginative and addictive games, such as Nintendogs.

Real Swing
£39.95
Gizoo www.gizoo.co.uk

Yes, it's daft – but plenty of people buy the Tiger Woods computer game, so this is perhaps the next step in digital golf. The Real Swing includes a small plastic golf club and a base station unit that contains a Cmos camera sensor and plugs into a TV. The sensor measures the speed and direction of your swing and then transmits that data to the onscreen 18-hole golf game that's displayed on your TV. Up to four people can play.

PC DAB Radio
£39.95
Gizoo www.gizoo.co.uk

Quite a few TV tuner cards include a radio receiver, but these tend to work with just good old-fashioned analogue FM and LW radio stations. The PC DAB Radio is a little USB widget that can plug into your PC or laptop and provides access to digital audio broadcasting (DAB) radio. It measures just 8cm long, 4cm wide and 1cm thick, so it's easy to carry around when you're on the road with your laptop.

Philips Wireless TV Link SLV3100
£41
Philips www.philips.co.uk

The Philips Wireless TV Link SLV3100 allows you to take a TV, cable or satellite signal and beam it wirelessly to a second TV in another room. It's dead handy if you've got a fixed receiver – such as a Sky box – in one room but you need to watch TV somewhere else in the home. The SLV3100 works with just one additional TV, but there's also the more expensive SLV5400 that can beam signals to three extra sets.

Sennheiser LX 90 Style
£34.99
Sennheiser www.sennheiser.co.uk

We've always liked Sennheiser headphones, and it has now launched a new Style range just in time for Christmas. The most affordable – and stylish – set is the LX 90, which costs just £34.99. Instead of a headband, the LX 90 headphones are held in place by a flexible and lightweight metal wire that is coated in plastic – a design that combines the convenience of earbuds with the comfort of headphones. And, yes, they sound pretty good too.

Zip-Linq Road Warrior
£34.99
Zip-Linq www.widget.co.uk

A handy and affordable little gift for anyone who travels a lot with their laptop, the Road Warrior kit includes a selection of cables and adapters so that you can connect all sorts of devices to your laptop while you're on the road. There are Ethernet network cables, extendable USB cables and adapters for various printers, cameras and other devices.

The kit also includes a small mouse and a spare set of earphones.

Verballs
£34.99
Aardvark Innovation www.verballs.com

Verballs are cute, but they're also quite handy if you use the Skype Voice over IP (VoIP) service. The Verballs are actually hands-free speakerphones. Each one has a microphone and speakers inside it, so you can stick it on your desk and talk to it when you want to make a call. When you receive a call its horns flash and arms wave to let you know that someone wants to speak to you. They also work with a VoIP softphone or other VoIP applications such as those from MSN, Google, Yahoo or AOL.

Belkin Wireless Calculator Keypad
£38
Belkin www.dabs.com

A good present for the laptop-toting techie. The name says it all – this is a wireless numeric keypad that you can use to quickly bash numbers into spreadsheets and databases. It also includes a built-in calculator to help with on-the-spot number-crunching, and there's a special send button that will deliver the result of any calculation to your PC and insert it straight into your spreadsheets. There's even a wireless mouse thrown in for good measure.

Brenthaven Edge Laptop Bag
£34.95
Apple UK
www.apple.com/uk/thestore

Brenthaven started out by designing rugged wilderness gear for mountain trekking types – until Apple talked it into designing some super-tough bags for laptops. Check out its website and you'll see videos of the company testing the bags by throwing them off the back of a moving truck (with laptop inside). There are several bags in Brenthaven's Core range, but we'll opt for the slimline Edge bag that you can use as a briefcase or shoulder bag.

Solio
£59.99
Better Energy www.solio.com

Initially dismissed as something of a gimmick, the Solio solar charger has become very popular – and has even been given the thumbs up by Bill Clinton at his recent Global Initiative conference on tackling global warming. The blades of the Solio spread out and soak up sunlight and then use it to charge electrical devices such as iPods, mobile phones and digital cameras. It's available in four colours – white, black, silver and pink, but unfortunately, not green.

Nostromo N52 Gamepad
£25
Belkin www.belkin.co.uk

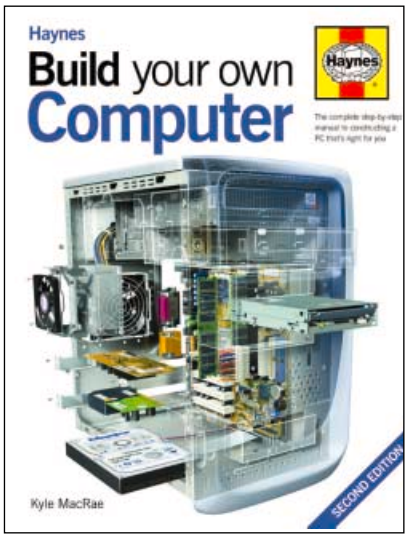
The Nostromo Gamepad looks like the result of an explosion in a Lego factory, but it is popular with many games fans. It combines a set of programmable keys with a small joystick, allowing you to control onscreen movement and assign commands such as 'fire' and 'reload' to the keys. It can be used for shoot-'em-up games, but is particularly useful for the complex sets of commands used in strategy games.

Mijam Drummer
£21.99
Iskins www.iskins.co.uk

OK – this is embarrassingly daft, but still kinda fun all the same. The Mijam digital drum sticks work in two modes. Connect them to a set of headphones or speakers and you can play them like a standalone set of drums, electronically simulating traditional drum sounds such as snare drum, hi-hat and cymbals. Alternatively, you can plug them into an mp3 player or CD player and play along with your favourite tunes. Just don't try it on a train, please.

Anime Studio
$49.99 (about £27)
E-frontier www.e-frontier.com

Anime Studio is great fun, but it's also a powerful creative tool. It's a simple animation program that can be used to create Southpark-style animations quickly and easily. The program includes dozens of sample files that you can use to get up and running with minimum fuss, while more experienced artists can use its 'bone-rigging' tools to create complex animation sequences. The full price is $49.99 but there's a free trial version available from the website.

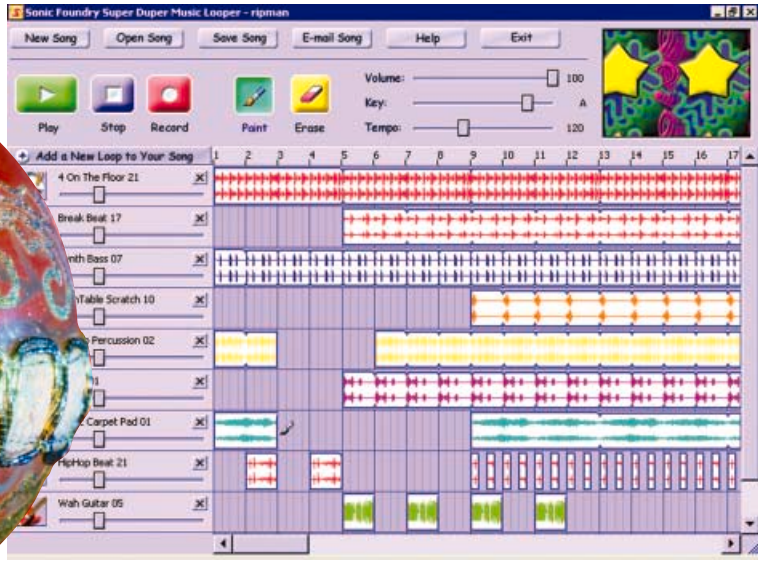


Build Your Own Computer
£15.99
Haynes www.haynes.co.uk

Publisher of DIY car workshop manuals, Haynes has branched out into computers. This is the updated edition of *Build your own computer*, which covers everything you need to know about building a custom PC. There are chapters on the basic components, such as motherboards, different types of processor, and small-form factor PCs. There are also sections that explain the mysteries of the Bios and backing up your hard disk.

Kensington Wifi Finder
£13
Kensington www.amazon.co.uk

There are more and more Wifi hotspots springing up, and you can use the tiny Wifi Finder to detect any wireless networks in your current location. It's small enough to use as a keyring, so you can just grab it from your pocket and press a button to detect any 802.11b or 802.11g networks in the area without having to fire up your laptop. It can also detect Bluetooth devices, such as printers or mobile phones.



Super Duper Music Looper
£9.99
Sony
www.pcworld.co.uk

Most music software is horribly complicated and daunting for beginners, but Sony's Super Duper Music Looper is a fun, easy-to-use music program (similar to Apple's popular Garage Band software for the Mac). The program includes dozens of prerecorded 'loops' – instruments and drum beats that you can combine to create songs. As the name suggests, it's mainly designed for kids, but is a good way for adults to get started with music software as well.

Firebox Gift Voucher
£5-£400
Firebox www.firebox.com

Firebox sells all sorts of electronic gadgets – including the Ion USB Turntable reviewed on page 59 – so if you're looking for a last-minute present for someone this Christmas, you could do worse than give them one of Firebox's gift vouchers. The vouchers start from £5 and go up to £400, and you can arrange for them to be emailed to friends along with a message so they know who sent it.

Commodore C64 Plug'n'play
£24.95
www.firebox.com

We couldn't resist this one, even though it's been out for a while. It's a self-contained battery-powered resurrection of the original Commodore 64 built into a retro-styled joystick. It comes with 30 original games including Speedball, Mission Impossibubble and Pitstop 2. And the beauty is you don't have to wait ages for it to load a cassette – just turn it on and plug it into your TV's composite video and audio ports using the two RCA jacks.

Flexible Keyboard
£12.95
Gizoo www.gizoo.co.uk

This is another daft-sounding idea that can turn out to be quite useful. The Flexible Keyboard is a full-sized USB keyboard that measures 50cm wide, 15cm deep and just 1cm thick. However, it's made out of a silicon membrane that is completely flexible and can quickly be rolled up and stored in a briefcase or backpack. You can use it with laptops or other devices that don't have a full-size keyboard, and it's tough enough to be used in all sorts of outdoor environments.

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EDITED BY
WILL STAPLEY

REVIEWS

WHAT'S NEW THIS MONTH

Not content with the success of its Core 2 Duo processors a few months back, Intel has now moved on to quad-core. As you'll read in our review of the Mesh Elite E6600 Express on page 75, although the potential is clearly there, many applications won't take advantage of the four cores and some won't run at all – something that will disappoint gamers who wanted to see the benefits of quad core immediately.

Nevertheless, Intel is looking to continue its theme of adding extra cores, and we're hearing that in five years it expects to have processors with a staggering 80 cores.

If PC gaming isn't your bag, Nintendo's Wii might be more up your street. We were invited down to the HQ of Mario and Co and spent a few hours with the forthcoming console. Thanks to its innovative control system it adds an extra dimension to gaming. You can read our in-depth preview on page 76.

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OUR SCORING

Excellent ★★★★★ Very good ★★★★☆ Good ★★★☆☆ Below average ★★☆☆☆ Poor ★☆☆☆☆

OUR AWARDS

Editor's Choice: The best product in a comparative group test. Anything that wins this award is of better quality than its competitors.
Recommended: A product that combines great features, usability and value for money.
Great Value: Not the best in class, but a product that has superior features and performance for the price.

Editor's Choice

Recommended

Great Value

'Nintendo's Wii will be available in time for Santa's big deadline, which gives it an advantage over Sony'

Read the review on page 76

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QUAD-CORE PC

Hi-grade Ultis Tachyon QX6700

Quad core is here, but software developers are playing catch-up

This Hi-grade PC hides something new at its heart: Intel's new quad-core chip, the Core 2 Extreme QX6700.

With the gigahertz wars seemingly over, it marks another step forward in ramping up the number of cores in a processor; multiple cores allow you to do more at the same time without a computer becoming slow or unresponsive. Incredibly, Intel hopes to continue increasing the number of cores to 80 over the next five years.

The Core 2 Quad is two Core 2 Duos fitted together in a single package. As a result, the Level 2 (L2) cache is made up of two 4MB caches. To the user this means the CPU is power hungry. It has a 130W power envelope; double the 65W a Core 2 Duo draws. The 130W power requirement was typical of high-end, hot-and-hungry Pentium D processors, but at least you now get four fast cores for the power drawn.

The Core 2 Extreme QX6700 is an unlocked processor aimed at hardware enthusiasts, which means it should be easily overclocked. The clock multiplier is set to 10 as standard so the clock speed of 2.66MHz results in the processor running at 2.66GHz (10 x 2.66MHz).

We managed to adjust the clock multiplier to 11, which resulted in a speed of 2.93GHz. Adjusting the front-side bus (FSB) allowed us to boot the system at over 3GHz without a voltage increase.

However, at 3GHz the system behaved erratically and performance results didn't improve. We expect retail systems to clock over 3GHz flawlessly, but because of limited time, we couldn't investigate the problem further. Core 2 Duo systems are fantastic overclockers, but the QX6700 requires more cooling so won't be quite so successful.

The machine houses two Sata (serial ATA) hard disks. A fast 150GB 10,000rpm disk is loaded with Windows and main applications, which allows for games and programs to run at speed, while a 500GB 7,200rpm disk provides acres of space for photos, music and videos.

The Ultis Tachyon QX6700 is no slouch when it comes to games thanks to an SLI-based Nvidia Geforce 7950GX2 graphics card. It produced a 3Dmark05 score of 14,169; although hugely impressive, it's nowhere near the king-of-the-hill 3GHz Chillblast Fusion Hardcore X1900XTX Crossfire, which set a lab record of 17,388, but it is comparable to other systems with the Geforce 7950GX2.

Quad-core architecture can cause problems with some applications. As a result, we couldn't run our usual Far Cry benchmark, and it was a similar story with Call of Duty 2. Once game developers get their hands on the new processors, patches will no doubt follow to allow compatibility.

Performance aside, the case is a very average affair and doesn't reflect the high-end nature of this machine. The front is made from plastic and the DVD drive buttons are uncomfortable to use because they depress too deeply.

The case is average looking, but inside this is a good system

Unlike AMD's processors, Intel's still lack integrated memory controllers, which means the Northbridge must negotiate between Ram and the CPU. The result is a hot Northbridge and the largest heatsink we've ever seen. Combined with a large fan and aluminium heatsink with copper heatpipes over the CPU, the case is jam-packed.

A 600W power supply keeps the system ticking along. This hummed a fair bit and meant the whole system was surprisingly noisy; the lack of rubber noise absorbers on hard disks exacerbates this.

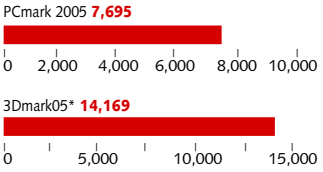
When it hits the shelves, Intel's new quad-core processor will retail for at least £700 – the same price as Intel's previous top dog, the Core 2 Extreme X6800. Although you get a lot for your money, the £2,178 price tag of this system seems expensive, considering some software is not guaranteed to work without patches.

If you overlook the cheap case, it is a good system and benefits will be seen in video-editing, music-compression and server applications. But for the average user the system is overkill. Gamers should stick with higher-clocking Core 2 Duos since the current crop of computer games will get no boost from the extra cores. Game developers are suggesting we will have to wait at least a year before new games start to take advantage of quad core.

A lower-clocked 2.4GHz quad core will be released shortly. As well as being cheaper, it will only consume 80W, so it may be a more viable prospect for consumers to wait for a lower speed chip with a higher FSB.

Emil Larsen

Performance



*Tested at 1,024 x 768 in 32bit colour

Details

Price £2,178
Best price www.pcw.co.uk/bestprices
Contact Hi-grade www.higrade.com
Specifications Intel Core 2 Extreme Quad QX6700 (2.6GHz) • 2GB DDR2 800MHz • Nvidia Geforce 7950GX2 (1GB Ram) • 500GB hard drive (7,200rpm) • 150GB hard drive (10,000rpm) • 2 dual-layer DVD writers • Hi-grade keyboard and mouse • Gigabit Lan • 4 USB2, 1 Firewire • Open Office • Windows XP Professional • One-year onsite warranty

Verdict

Pros Quad core; SLI graphics; hard disk setup
Cons No real speed increase with gaming; no monitor; bland case
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★☆
Overall An expensive system for enthusiasts only
★★★★☆

DUAL-CORE PC

Mesh Elite E6600 Express

A good-value system with a free upgrade to Windows Vista Premium

In an attempt to hook those with an interest in the forthcoming Windows Vista operating system, Mesh is offering a free upgrade to Windows Vista Premium with its latest PC. This upgrade will, of course, only come into effect when Vista is actually launched; at present, this is looking like some time in January 2007 for consumers.

Unlike the Hi-grade Ultis Tachyon QX6700 quad-core system (see page 68), Mesh has chosen to stick with a Core 2 Duo-based system and a 2.4GHz E6600 CPU. It's not Intel's fastest dual-core processor (that title belongs to the 2.93GHz X6800 Core 2 Extreme processor) but as indicated by the Sysmark 2004 SE and PCmark05 scores of 308 and 7,014 respectively, it's a perfectly capable model and better value for money than the X6800. The 2GB of DDR2 Ram supporting the processor will also be welcomed by Vista when the upgrade comes into effect.

Nvidia's Geforce 7950GT graphics card seems to be the favourite among system integrators at the moment, and it's not difficult to see why. Unlike the vastly more expensive Geforce 7950G2X, which houses two separate GPUs, this model is a good mix of value for money and performance. The 3Dmark05 score of 9,414 demonstrates that, although not the fastest we've seen, this computer will be more than capable of running the latest games at decent resolutions.

Mesh has kept the price of this PC down by including a 19in Sony SDM-HS95PR monitor as opposed to a 20in model. Although we have no qualms over the quality of this monitor, its native resolution of 1,280x1,024 means the graphics card won't be able to demonstrate its full power. A 20in TFT with a higher native resolution of 1,600x1,200 would have been a far better option, even if it pushed up the price a bit.

The motherboard, a P5N32-SLI from Asus, is passively cooled, but the benefits of having a fanless model are cancelled out by the not-so-quiet Intel CPU fan. It isn't massively noisy, but in a quiet room you'll definitely hear it whirring away. With quieter CPU fans relatively cheap, we'd recommend upgrading this one.

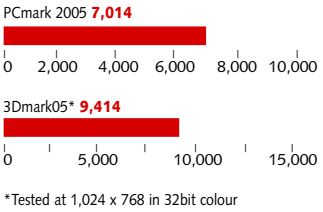
In terms of features the motherboard isn't lacking. Among other goodies you get full Raid support, four serial ATA (Sata) ports, two Gigabit Lan connections and even a built-in hardware firewall. A second x16 PCI Express slot means you could upgrade to quad-SLI by investing in two Geforce 7950G2X cards. However, with the current quad-SLI drivers delivering relatively poor performance gains over standard SLI (see our review of Mesh's quad-SLI PC at **www.pcw.co.uk/2162948**), we'd recommend sticking with the single 7950GT for the moment.

Other items include a single 300GB hard drive, two DVD drives (one a dual-layer writer the other a DVD-Rom), a Creative Inspire T7900 7.1 surround-sound speaker system and a Logitech cordless keyboard and mouse. Microsoft Works 8.5 and a selection of Cyberlink DVD applications make up the software bundle.

At £1,049, Mesh has priced this system very competitively, especially considering the free upgrade to Vista Premium. However, considering the powerful graphics and fast processor will appeal to gamers, it's a pity Mesh couldn't include a 20in TFT to really show what it's capable of.

Will Stapley

Performance



*Tested at 1,024 x 768 in 32bit colour

Details

Price £1,049
Best price www.pcw.co.uk/bestprices
Contact Mesh
www.meshcomputers.com
Specifications Intel Core 2 Duo E6600 (2.4GHz) • 2GB DDR2 667MHz memory • Asus P5N32-SLI SE • Nvidia Geforce 7950GT (256MB) • 19in Sony SDM-HS95PR • 300GB hard drive • Sony dual-layer DVD-RW • Sony DVD-Rom • Logitech cordless keyboard and mouse • Creative Inspire T7900 • Windows XP MCE 2005

Verdict

Pros Graphics; upgrade to Vista
Cons 19in TFT; noisy Intel CPU fan
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★☆

Overall The Vista upgrade is a bonus, but we'd have preferred a 20in TFT

★★★★☆

GAMES CONSOLE

Nintendo Wii

A sneak peek at this small, cheap and innovative console

What's in a name? Only three little letters, in the case of Nintendo's next-generation games console, but three letters that have been causing equal amounts of consternation and hilarity across the English-speaking world since the system was officially christened back in April.

The Wii will be available in the UK in time for Santa's big deadline (8 December to be precise), which gives it a distinct advantage over Sony's more conventionally named Playstation 3, the European release of which has been delayed (again) until March 2007.

Nintendo's strategy is almost the opposite of that adopted by its competitors. While Sony and Microsoft are pushing their respective consoles forward in terms of sheer power, graphical prowess and multimedia functions, Nintendo is far more concerned with replicating the massive crossover success it has recently experienced in the handheld games market with the DS.

In technical terms, it's largely unfair to compare the Wii directly with the Xbox 360 or the Playstation 3, which is probably why Nintendo is being a little cagey about the console's specifications prior to launch. What we know is that inside the little white box you'll find a tailor-made PowerPC processor (co-developed with IBM), along with 512MB of internal flash memory for storage, built-in Wifi, two USB ports, an SD memory card slot and a bespoke graphics chip from ATI. The Wii won't be capable of high-definition video output, unlike the Xbox 360 and the PS3.

In addition to its own 12cm disc format, the Wii is 100 per cent backwards-compatible with Gamecube games, and a Virtual Console system will give users access to a library of downloadable titles originally released for the old NES, SNES, N64 and Sega Megadrive consoles.

The Wii Remote is completely wireless (using a Bluetooth connection that works within a range of up to 10m) and features both a three-axis motion sensor and an onscreen pointer, the latter communicating with the console via a screen-mounted sensor bar.
This reduces the need for confusing buttons, although a four-way D-pad, a trigger and five other function buttons are present for more conventional menu navigation and gameplay.

A secondary controller, the Nunchuk, can be plugged into the Wii Remote and held in the player's other hand. The Nunchuck has a motion sensor as well as an analogue thumbstick and a pair of trigger buttons.

The control system is simple to pick up and play, even when the fundamental way that the controllers are employed changes slightly from game to game.

In a golf game, for example, you simply hold the Wii Remote as if it were the handle of a nine iron and either give it a hefty swing for a tee off or a gentle nudge for a short putt. Switch to a tennis game and the Wii Remote becomes your racket, sensing when you perform a forhand or backhand without needing to be pointed directly at the screen. It's incredibly intuitive and Nintendo hopes that the Wii's control system will appeal to those who haven't traditionally shown much interest in gaming.

That said, the control system will be a hit with hardened gamers. The Remote/Nunchuk combination is perfect for first-person shooters, for example, allowing for precision aiming in a way only previously experienced when using a mouse and keyboard.

The Remote can also be held sideways in both hands and used like a steering wheel, slashed like a blade for swordfights, punched (along with the Nunchuk in the other hand) for fighting and boxing games, or aimed using the onscreen pointer for target practice. The possibilities for this clever control system seem almost limitless.

During our time with the Wii, we played 10 titles, all of which demonstrated different ways that the controller could be used. Particularly effective were Wii Sports, The Legend of Zelda: Twilight Princess and Trauma Centre: Second Opinion.

Visually speaking, the games had more in common with those of the current-generation consoles than, say, the Xbox 360 (although, admittedly, nothing we played was finished code). That aside, each title was accessible, well presented and, crucially, bags of fun to play. Given the massive potential of the Wii controller, the system's bold batch of launch titles is hopefully just the beginning.

Assuming that first and third-party software developers can successfully exploit the system's innovations, there's no reason the Nintendo Wii won't prove to be much more of a big splash than a damp squib.

Jonathan Parkyn

Details

Price £180
Best price www.pcw.co.uk/bestprices
Contact Nintento
www.nintendo-europe.com
Specifications IBM PowerPC processor • 512MB internal flash memory • ATI-developed graphics chip • 2 USB ports • 802.11b/g • SD memory card slot • Wii Remote wireless (Bluetooth) controller • Nunchuck controller • Sensor bar for onscreen pointer • Online multiplayer • Virtual Console games download service • Wireless communication with DS console • 4 Gamecube controller ports • 2 Gamecube memory card ports • 215x44x157mm (wxdxh)

Verdict

Pros Small; cheap; innovative controller system; original software titles; backwards compatibility
Cons Less raw power than its competitors; few added-value features; no HD; silly name

Overall Nintendo seems to be putting its experience with the DS to good use by going for originality and playability over power and multifunction capabilities, but only a steady stream of strong software will get everyone bursting for a Wii

MOBILE PHONE

Virgin Mobile Lobster 700TV

Another attempt at getting people to watch TV on their mobile phone

Late in 2005, we took a look at Vodafone's Mobile TV service that streamed Sky TV channels over the 3G network. Virgin Mobile TV differs from this because it receives broadcasts over the DAB (Digital Audio Broadcast) network – the big advantage being that you're not clocking up huge data downloads while viewing.

The first phone from Virgin to support its Mobile TV service is the Lobster 700TV. It's a Windows Mobile powered phone and, thanks to its curvy design, sits reasonably comfortably in the hand. TV is accessed either via the menu system or a dedicated TV button on the right-hand side of the phone; the headset must be connected while watching TV, since it acts as an aerial.

The channel line-up is, at present, limited to just BBC One, ITV1, Channel 4 and E4. Although BBC One, ITV1 and E4 are all simultaneous broadcasts of what you receive on a standard TV, Channel 4 is just a collection of short clips made specifically for mobile TV. Some shows also can't be shown due to licensing restrictions.

Quality is, as you'd expect, nothing like what you get via Freeview on a standard TV. Both audio and video are heavily compressed and frequently out of sync. If you're standing still in a good reception area it's perfectly watchable, but sit on a moving train or in a car and you'll soon find quality drops and the video stream will regularly cut out altogether. Over 50 DAB radio stations are available and, when in a decent reception area, audio quality is good.

Although you can just about cope with listening to the radio when it's dropping in and out of reception, when it comes to watching TV this sort of intermittent service isn't an enjoyable experience.

We tried the Mobile TV service in various locations. In central London it was possible to pick up a good signal in most areas (even deep within our offices). Moving outside the M25 towards Gatwick Airport resulted in poorer reception, and in many areas there was no reception at all.

When you start adding services such as video to a phone, the impact on battery life will always be a concern. However, we had the TV going solidly for over two hours before the battery died, which isn't at all bad. Vodafone claims a talk time of five hours and a standby time of just under six days.

In central London we got good reception

Pricing is reasonable, with the Lobster 700TV available free from Virgin Mobile with various contracts starting at £25 per month. If you're willing to part with £39.99 at the start of your contract you'll be able to take advantage of slightly lower monthly charges. Access to the Mobile TV service will remain free for the duration of your contract.

Other features include a 1.3-megapixel camera and all the various Windows Mobile calendar, calculator and organiser apps.

The question has to be asked as to whether mobile TV is a service people actually want. It will undoubtedly get better as time goes on, and Virgin's use of DAB instead of 3G is a good move, but with the current limited crop of channels, poor quality and reception issues, it's difficult to recommend. *Will Stapley*

Details

Price From free (depends on contract)
Best price www.pcw.co.uk/bestprices
Contact Virgin Mobile www.virginmobile.com
Specifications 2.2in screen (240x320) • Integrated digital aerial • 30MB memory • 5 hours talktime, 140 hours standby • 1.3-megapixel camera • Tri-band • Windows Mobile 5 • 111x24x58mm (wxdxh) • 140g

Verdict

Pros Reasonable quality in good reception areas; DAB; battery life
Cons Limited channels; not good on the move; small screen; not 3G

Features ★★★★☆
Performance ★★☆☆☆
Value for money ★★★☆☆

Overall Gadget freaks will love it
★★★☆☆

DIGITAL SLR

Nikon D80

Personal Computer World RECOMMENDED

A 10-megapixel sensor, bigger screen and improved functionality

The 2.5in rear LCD's wider viewing angle makes it easy to view images

Nestling in the middle of Nikon's range of six digital SLRs, the D80, like the D70s it is set to replace, straddles the gap between the entry-level D50 and semi-professional D200 models.

By borrowing features from both and adding a few new ones, the camera enables enthusiast photographers to take professional-looking photos without the added expense of industrial-strength ruggedness and features aimed specifically at the photo studio.

The biggest single improvement in this camera is an increase from six to 10 megapixels, but it's more than just a D70s with a new sensor. Many improvements have been made to the camera, which is now easier to use and benefits from plenty of the consumer-oriented features in Nikon's Coolpix range of compact cameras.

The sensor is very similar to that in the D200. Both deliver the same image resolution, but the D80 uses a single-channel memory architecture, which results in slightly slower data transfer rates. Where the D200 is capable of continuous shooting at up to five frames per second (fps), the D80 is limited to the same 3fps rate as the D70s. The new camera can shoot up to 23 Jpeg frames at this rate – around twice as many as the D70s.

Another obvious upgrade is the 2.5in rear LCD panel, which has 100,000 extra pixels and a wider viewing angle. This makes both reviewing images and navigating menus easier, especially as the D80's faster processor makes the interface much snappier. It is very quick on the draw: from power-on, you can shoot almost instantaneously. It's so fast that if you flick the power switch and hit the shutter release as fast as you can there's no perceptible delay.

The control buttons have also been moved around to make control easier. You can now navigate the menus with one hand, and in review mode you can zoom in and out of your pictures more easily by using dedicated zoom-in and zoom-out buttons instead of holding down a button with one hand and sliding a thumb wheel with the other.

Not only is the menu system bigger and clearer, but it also contains new options. A retouching section allows you to edit your photos in-camera in a variety of ways including cropping, resizing and red-eye removal.

With D-lighting you can dramatically improve some photos, for example where fill-in flash could have been used to compensate for backlighting. These options are great for those who don't have the time or the inclination to process their images on a PC and all the edits are non-destructive, leaving the original images intact.

Although great in point-and-shoot mode, the D80 is also a very customisable camera that offers extra-high ISO modes with configurable noise-reduction options. There are no complaints about image quality either. In general it is excellent, and flexible user control of noise-reduction and sharpening options means you can get your photos looking just the way you want, without having to process the raw files yourself.

Three colour modes are available; two using sRGB to optimise skin tones and landscapes and a third using Adobe RGB for accurate colour reproduction of materials and for those with professional colour-managed workflows. The D80 also has a second top-mounted LCD status display and a true pentaprism viewfinder with a pleasingly big image.

It may cost £600 less than a D200, but the D80 is a serious camera capable of professional results. It's a big step up from the D50 and a worthy successor to the D70s.

Paul Monckton

Details

Price £899.99 (inc 18-70mm lens kit); £949 (18-135mm lens kit); £699.99 (body only)
Best price www.pcw.co.uk/bestprices
Contact Nikon www.nikon.co.uk
Specifications Digital SLR camera • 10.2 megapixels • 23.6x15.8mm CCD • 2.5in LCD • 30-1/4,000sec shutter speed (plus bulb mode) • ISO 100-1,600 (Boosted modes up to approx 3,200) • SD and SDHC memory card support • Raw and Jpeg modes • USB2 Hi-speed • Nikon F mount lens support • Pentaprism viewfinder • 132x77x103mm • 585g

Verdict

Pros 10 megapixels; 2.5in LCD; enhanced usability
Cons No raw processing software as standard
Features ★★★★★
Performance ★★★★★
Value for money ★★★★☆

Overall An excellent feature set combined with good quality and usability make the Nikon D80 a great mid-range purchase

★★★★★

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- Simple, cost effective storage
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DIGITAL CAMERA

Canon Ixus 900 Ti

A quality compact digicam, but one that fails to raise the bar

New to Canon's Ixus range, the 900 Ti is leader of the pack with 10 megapixels of shooting power in a sleek matt titanium chassis.

With eye-catching headline features such as these, the inclusion of just a 3x optical zoom is slightly disappointing, especially when manufacturers such as Kodak are now including dual-lens systems in their newest compact cameras for more powerful zooming. Nonetheless, the zoom itself is fairly responsive, even though it's a little jerky to operate and quite noisy.

The 2.5in screen at the back of the camera displays images clearly and responds quickly to changing lighting levels. In review mode it adjusts the orientation of an image according to the way the camera is held so the snap always appears to be the right way up. Just to the right of the screen is the control dial, which gives fast access to flash, macro, landscape and self-timer settings in shooting mode.

This dial is touch-sensitive, although this feature only really comes into its own in review mode, when you can scroll quickly through images. It can't be used to whiz through the options in the regular settings menus as you would using the similar-looking control dial on an iPod, which is a shame.

There's also an optical viewfinder just above the screen; a feature we're seeing less and less in compact digital cameras these days, but one that certainly still has its uses in conditions where it's harder to see what's displayed on the screen and to conserve battery life.

The mode dial lets you switch between auto shooting mode, automated scene mode, manual mode, review and video shooting mode. There are 18 automated modes in the scene settings line-up with all the usual suspects present including beach, snow and kids and pets for fast moving or unpredictable subjects.

Using the stitch assist tool it's possible to take up to 26 overlapping images and later stitch them together to make one continuous panoramic image. The right-hand edge of the previous shot taken is displayed on the left-hand side of the screen to make lining up shots easier.

In addition to these point-and-shoot modes, manual adjustments can be made to white balance, exposure, ISO and metering settings. The 900 Ti offers manually adjustable ISO speeds up to ISO 1,600 for flash-free indoor shooting. While this does allow you to capture shots in low lighting conditions that would be far too dark at lower ISO speeds, at ISO 1,600 our test shots were, unsurprisingly, horribly noisy.

We were more impressed by the Canon's minimum focusing distance of just 5cm in macro mode, which gave excellent results in our tests, producing detailed close-ups. Image quality was, on the whole, very good. Colours were strong without being overpowering and detail was captured well, right into the corners of our test images.

The titanium casing and the 10-megapixel image sensor that grabbed our attention at the start of this review were always going to nudge up the price for this camera, but at £399 it really is stretching the budget of the amateur photographer that it's aimed at.

It's still a decent camera and is simple to use, but we had hoped Canon would raise the benchmark of what we can expect from a compact digital camera with this new Ixus launch. *Jacqueline Williams*

Details

Price £399.99
Best price www.pcw.co.uk/bestprices
Contact Canon www.canon.co.uk
Specifications 10 megapixels • 3x optical zoom • 37-111mm (35mm equivalent) • f/2.8-f/4.9 • 2.5in LCD screen • Titanium casing • Touch-control dial • SD-card compatible • Pictbridge • Direct Print • 91.2x28.2x59.6mm (wxdxh) • 165g

Verdict

Pros 10-megapixel resolution; excellent image quality; clear, detailed close-ups
Cons Only a 3x optical zoom; expensive
Features ★★★☆☆
Performance ★★★★★
Value for money ★★★☆☆
Overall Another top performer from Canon, but it's expensive and fails to truly excite
★★★★☆

PHOTO PRINTER

Canon Selphy CP730

Print your digital photos with ease

For those who hanker after a simple life, this compact photo printer range will be a breath of fresh air.

The Selphy CP730 uses dye-sublimation print technology so setting it up for the first time is straightforward. Just insert the single slot-in ink cassette and load the input tray with paper.

Canon has also made it very simple to use, with a basic range of on-device controls. The mode button lets you choose to print images one at a time or in batches. As each photo takes just over a minute to print – one minute 10 seconds on average in our tests – the option to print several photos in one go is handy.

There are just three layout options: borderless, bordered and eight shots to a page. A date imprint can also be added to prints. A limited selection of effects allows images to be printed in black and white, sepia or with a vivid colour filter. In our tests there was very little discernible difference between prints with the vivid colour option enabled and those printed with default colour settings. There's also an option to crop images. As all these selections are made using the appropriate button to scroll through the options, there's no risk of getting lost in a complex onscreen menu.

The printer's 2in LCD screen doesn't display images particularly clearly, which can cause problems when printing directly from a memory card, as it's hard to differentiate between similar shots.

Print quality was good. As you'd expect from a dye-sub printer, images were smooth. Colours were bright and well balanced, although skintones were occasionally muted and overly pink.

Around 20p per print (using Canon's KP-108IP value printing pack), isn't cheap, but the CP730's simplicity will suit point-and-shoot photographers. *Jacqueline Williams*

Details

Price £139
Best price www.pcw.co.uk/bestprices
Contact Canon www.canon.co.uk
Specifications Dye-sublimation thermal transfer printing • 2in colour screen • 300dpi max resolution • Pictbridge compatible • Canon Direct Print compatible • Infra-red • USB2 • Memory card support: Compact Flash, Memory Stick, MS Pro, Pro Duo, Duo, Microdrive, MiniSD, Mini SDHC, Multimedia Card, SD, SDHC, RS-MMC • 178x131x63mm (wxdxh) • 955g

Verdict

Pros Easy to use; good print quality; range of connections
Cons More expensive than most high-street printers; small display
Features ★★★☆☆
Performance ★★★★★
Value for money ★★★★☆
Overall Simple to use; running costs won't break the bank
★★★★☆

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PHOTO PRINTER

Canon Pixma mini260

A good-quality compact photo printer, but it's a little on the heavy side

One of the newest faces on the inkjet block, the compact Canon Pixma mini260 has been designed with portability in mind and even has a foldout handle to prove it.

Despite its relatively small footprint of just 226x225mm (wxd), with it weighing just over 2kg you'll think twice before taking it out and about. Most of the action centres on what Canon calls the easy-scroll wheel – a dial used to navigate through the straightforward menu system in the same way you would on an iPod.

There's also a button dedicated to simplifying the menu navigation process by calling up a list of common printing and maintenance tasks, and offering fast access to each, as well as user guidance.

The slideshow option in the main menu shows all the images stored on a memory card or a connected digital camera in succession. The crystal-clear 2.5in LCD screen can be tilted to give the best viewing angle.

Seven different memory card formats are supported as standard, as well as Pictbridge and Digital Print Order Format (DPOF) for direct printing from a compatible camera and infra-red to print from a camera phone.

All the usual layout options are on offer. The Album Page setting is interesting and lets you print up to four images per page with space for captions or comments alongside, with a maximum paper size of 10x18cm.

Manual adjustments can be made to contrast and hue and there's a sepia filter, red-eye correction and image optimisation settings including face brightening and a vivid colour setting.

Photos took just under a minute to print and, in our tests, quality was very good. Colours were vibrant without being over-saturated, blacks were rich and detail was reproduced well.

A great printer with a reasonable price, the mini260 will do your snaps justice. *Jacqueline Williams*

Details

Price £119
Best price www.pcw.co.uk/bestprices
Contact Canon www.canon.co.uk
Specifications 9,600x2,400dpi • 20-sheet input • Irda, Pictbridge, USB2 • Compact Flash, Microdrive, Smart Media, Memory Stick, Memory Stick Pro, SD Card, MMC compatible • Max paper size 10x18cm • 226x225x82mm (wxdxh)

Verdict

Pros Good design; print quality; price
Cons Weight limits its portability
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★☆

Overall The Canon Pixma mini260 prints good-quality photos, has a user-friendly design and comes in at a decent price

★★★★☆

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SMARTPHONE

Rim Blackberry Pearl 8100

The corporate mobile email machine gets a streetwise makeover

Blackberry is the undisputed king of the corporate email market. But until now it has yet to capture the heart of the consumer.

The Pearl is Rim's push at the person on the street; no more bulky designs or confusing numeric nomenclatures. It comes with a cool name and style worth showing off.

This is like a Blackberry, only better. The thumbwheel is gone, replaced by a white rollerball below the 2.2in bright 65K colour screen. The ball lights up when you use it and looks a bit like a pearl. As a way to find your way around menus and web pages it's very good.

Despite its flash looks, this is a Blackberry through and through. Setting up mail is a doddle and once you've tapped in your details via the web, email will flow through like text messages. It's got a traditional Qwerty keyboard, but split over half the number of keys. With two letters per key, a predictive text-type application guesses what you want to say. This takes a bit of getting used to, but it's far more accurate than standard mobiles.

It's the first Blackberry to incorporate a camera – albeit only a 1.3-megapixel model, which is the bare minimum in these multi-megapixel days. The resulting snaps are passable, and there's a built-in flash for capturing images in the dark.

Once you're bored with the comprehensive set of applications, which stretches from diary and to-do list to media player and messaging, you can install your own. If you want a Blackberry but have been put off by their appearance, this is the model for you.

Our review model was supplied by T-Mobile (**www.t-mobile.co.uk**) and is available from free with a contract.

Will Head

Details

Price From free (depending on contract)
Best price www.pcw.co.uk/bestprices
Contact Rim www.blackberrypearl.com
Specifications 240x260 pixel screen • 64MB memory • 312MHz Intel processor • Qwerty-style keyboard • Bluetooth • Quad band • 50x107x14mm • 90g

Verdict

Pros It's a Blackberry, but is good looking and easily pocketable
Cons Keyboard takes a bit of getting used to
Features ★★★★★
Performance ★★★★★
Value for money ★★★★★

Overall If you need to stay in touch constantly but want to remain stylish, the Blackberry Pearl is the only option

★★★★★

SMARTPHONE

T-Mobile MDA Vario II HSDPA

A fully featured handset complete with high-speed internet

The Vario II from T-Mobile is not just a top-of-the-range handset, but it also supports HSDPA (high-speed downlink packet access) – upping the potential speed to a broadband-like 1.8Mbits/sec.

HSDPA isn't new – laptop cards supporting fast data connections have been around since the start of the summer. T-Mobile, however, claims this is the first handset to support the service.

Running it through an online speed test resulted in a 1.1Mbits/sec connection – not quite the promised maximum, but still faster than entry-level broadband. It was more than adequate for streaming full-screen movie trailers. The phones itself runs Microsoft's Windows Mobile 5 OS, providing full PDA functionality.

The full Qwerty keyboard hidden underneath the display is accessible by sliding the screen across. When open, the screen switches from portrait to landscape mode. The keyboard is very usable – definitely quicker than typing out words using predictive text.

The design is similar to the original Vario. There's a large 2.9in screen dominating the front of the unit and an arrangement of buttons at the bottom to provide quick access to commonly used functions.

Wifi is supported, so if you're in range of a public hotspot you can jump on a fast internet connection without cutting into your mobile bandwidth allowance.

Battery life is a claimed eight days' standby, 4.5 hours' talk time. With intensive use, though, we found this dropped to a couple of days.

As well as high-speed data, you get all the standard features you'd expect from a high-end handset. The rear-mounted camera can take pictures up to two megapixels, although it's a bit slow to respond.

If you want a feature-packed model, with fast internet on tap, then the Vario II is the model to go for.

Will Head

Details

Price From free (contract dependent)
Best price www.pcw.co.uk/bestprices
Contact T-Mobile www.t-mobile.co.uk
Specifications 240x320 pixel screen • HSDPA broadband • 2-megapixel camera • Qwerty keyboard • Bluetooth • Wifi • Quad band • 200 hours' standby, 300 mins' talk time • 58x113x22mm (wxdxh) • 176g

Verdict

Pros Fast data in a top mobile
Cons Not as fast as maximum; camera slow to respond
Features ★★★★☆
Performance ★★★☆☆
Value for money ★★★★☆

Overall If you're fed up waiting for downloads while you're out and about, then HSDPA in your hand with the T-Mobile MDA Vario II is a godsend

★★★★☆

PDA

Palm Treo 750v

Palm wants a piece of the Blackberry pie

The Treo 750v Smartphone is the first European Palm to run Windows Mobile 5 in favour of its own software. Its push emailing feature makes it a direct competitor to the Blackberry phones.

Inside is a Samsung 300MHz processor and 128MB of storage, of which 60MB is available. Quoted battery life is 4.5 hours' talk time or 10 days' standby. During testing, the phone ran for two working days.

The 240x240 pixel 2.5in LCD touchscreen is sharp and bright with the solid-feeling keyboard protruding just enough to be usable. Surprisingly, the onscreen virtual keyboard for use with the stylus is quick and accurate. The 1.3-megapixel camera is sharp but, as it's on the rear of the unit, it can't be used for video calls.

The Treo 750v comes with Bluetooth but no Wifi support. At 154g it's heavier than the Blackberry phones; however its rubber-like surface, plus the substantial weight, gives an impression of sturdiness.

The phone is exclusive to Vodafone, which brands Microsoft's Direct Push Technology Vodafone Business Email (VBE). During testing, this pushed emails to the Treo 750v every 10 minutes or so. It worked seamlessly and can be set to download emails between certain hours only.

The alternative to VBE is to download emails manually by clicking on a Send-Receive button, thus saving you the £15 inc Vat a month Vodafone charges (before data costs) for this service. The phone won't charge over a USB cable but its saving grace is an array of power plugs for Europe and the US.

The Treo 750v is one of the best Windows Smartphones we have ever used. Operation is easy and its construction is superb. The VBE service works extremely well, but is far too expensive for what it offers.

Emil Larsen

Details

Price Free-£150 (contract dependent)
Best price www.pcw.co.uk/bestprices
Contact Palm www.palm.com
Specifications 2.5in 240x240 display • 300MHz Samsung processor • 128MB flash memory • GSM/GPRS/Edge/UMTS • MiniSD card slot • Hands-free headset jack • Talk time 4.5 hours max • Standby time 10 days max • Bluetooth, infra-red • 1.3-megapixel camera • USB sync cable • Windows Mobile 5.2 • 111x58x22mm (wxdxh) • 154g

Verdict

Pros Build quality; fast 3G internet; Direct Push Technology is superb
Cons No Wifi; no USB charging; heavy; VBE is expensive
Features ★★★★☆
Performance ★★★★★
Value for money ★★★☆☆
Overall Works seamlessly with Windows Mobile
★★★★☆

DIGITAL CAMCORDER

Sanyo Xacti VPC-CA6

A good-looking camcorder, but the awkward design and high price let it down

The Xacti VPC-CA6 combined digital camera and video recorder is designed to be held in an upright pistol-grip position. The camera has a 6-megapixel CCD for stills and a 640x480 30fps (frames per second) one for movies. Sound is recorded at 48KHz 16bit in Aac format from two microphones.

A viewfinder isn't included so you're forced to use the bright 2in LCD. The 5x optical zoom operates smoothly, but the ISO 50-400 range is limited when other cameras can operate at ISO 1,600 or higher.

A comprehensive, yet basic software suite includes Ulead DVD Movie Factory 4.0 SE, Photo Explorer 8.5 Basic and Motion Director 1.1.

Sanyo claims the Xacti VPC-CA6 is weather-proof and designed for an active lifestyle. It is splash-resistant and, according to Sanyo, can be operated with wet hands. However, the guarantee doesn't cover the camera being sprinkled with water, which is a little contradictory.

We feel the screen flips out the wrong way and this makes the device difficult to hold. When first picking up the camera, it is instinctive to put your index finger over the lens or flash. The screen will only flip in and out so, when closed, the display points outwards, offering it no protection from getting damaged.

Test pictures showed a lot of noise and grain. The flash was not particularly powerful and only lit up the immediate distance. The video was good, but no better than VGA movie modes on other 6-megapixel cameras.

A 1GB SD card is included, but £300 is steep for a 6-megapixel camera, especially when models such as the 10megapixel Casio Exilim Z1000 are available for around £205 with a 30fps VGA movie mode.

This camera has a lot of style, however it is awkward to hold, the pictures are poor and the price is high.

Emil Larsen

Details

Price £300
Best price www.pcw.co.uk/bestprices
Contact Sanyo www.sanyo.com
Specifications 6-megapixel CCD • VGA movie mode (30fps) • 1GB SD card • ISO 50-400 • 5x optical zoom • 2cm macro

Verdict

Pros Competitive zoom; good software package
Cons Terrible ergonomics; expensive; not robust; noisy pictures
Features ★★★☆☆
Performance ★☆☆☆☆
Value for money ★☆☆☆☆
Overall The Sanyo Xacti VPC-CA6 is a stylish piece of kit, but there are much better alternatives for the same price
★★☆☆☆

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SKYPE WIFI PHONE

Netgear SPH101 Skype Wifi phone

A new generation of handset for Skype, but you pay for the privilege

Making free calls over the internet using Skype used to mean your PC had to be switched on. But this is changing with a new class of Wifi-enabled Skype handsets.

The Netgear SPH101 Skype Wifi phone is one of two such handsets we are testing, the other coming from SMC. While the idea of computer-free Skype calls from anywhere sounds enticing, it's difficult not to be disappointed by the restrictions imposed by these phones.

While you can make free Skype or cheap Skype Out calls using the Netgear, it hardly frees you from your home or office, as the handset cannot be paired with wireless networks that require browser-based sign-up, such as hotspots in coffee shops, hotels, airports or even some secure company networks. So it's not a mobile that can be used on your travels.

Nor, despite its keypad, can it use Skype's instant messaging function and, although you can join in a conference call, it's not possible to set one up yourself. With no camera, video calls are obviously not an option.

Add to this its £170 price and poor battery life and you start to wonder why anyone would want this phone.

The aforementioned battery life is a claimed 30 hours on standby, but if you lose the network link it searches continuously until the battery dies. Our first time using this phone from a full charge garnered just six hours on standby before it ran out of juice.

The supplied AC charger connects via a USB socket on the phone, so you can charge it from a standard USB port if you wish.

Hooking up to a wireless network was occasionally a little fiddly, but not overly so. On one day it doggedly refused to join our workplace Wifi despite numerous efforts, yet later linked on the first attempt with the home network.

It's slightly smaller than the SMC handset and both companies have opted for a white case. The keys have a good feel to them and are responsive, but the phone is a little slow to join a network and download your contacts. Making a Skype call is, however, as simple as using the traditional software method. Both Skype Out and Skype In services are supported, so you can make calls to non-Skype users via landlines or mobile numbers, as well as receive calls from non-Skype users. Note that emergency calls are not supported.

Call clarity between two Wifi handsets was excellent but there was a noticeable drop in quality when calling the same location using a headset connected to the PC. Although this drop in quality is not caused by the Wifi handset, it's no comfort if you have paid £170 to see no improvement.

These phones are primarily aimed at businesses that make many international and inter-branch calls or home users who want an easy way of making Skype calls. If in an office, most people will have their computers on so could use headsets or Dect Skype phones, which have similarly limited functions yet are sold at a fraction of the cost (although the PC must be on for the phones to work).

It's not that this first-generation Wifi Skype phone is bad – the idea of using Skype without needing a PC switched on is certainly attractive. But until it is either much cheaper, has more functions, or preferably both, we recommend you stick with the alternatives.

Rob Jones

Details

Price £169.99
Best price www.pcw.co.uk/bestprices
Contact Netgear www.netgear.co.uk
Specifications Skype account required • 802.11b/g wireless network • 46x110x19mm • 110g

Verdict

Pros PC need not be on
Cons No instant messaging; no video; can't be used from commercial hotspots; expensive

Features ★☆☆☆☆
Performance ★★★☆☆
Value for money ★★☆☆☆

Overall If this phone cost about £70, you could accept its limitations for the call quality it offers, but at £170 it is hard to recommend

★★☆☆☆

Aopen i945GTm-VHL

Price £188 **Contact** www.scan.co.uk **Overall** ★★★★☆

A small mobile CPU-based motherboard from Aopen that uses notebook-type So-Dimm memory. This model is built on a Micro ATX PCB, making it an ideal if very expensive candidate for home-theatre PCs.

A CPU heatsink and 7cm fan is included in the package; this will spin right down to 2,200rpm when processor use drops. When things start to get a bit warmer, the spin speed increases to 3,000rpm.

The Northbridge is passively cooled, which keeps noise down and highlights the i945GTm-VHL's case as the basis for a lounge-based PC.

So-Dimm slots cater for DDR2-400 up to DDR2-667 memory, with the maximum capacity being 2GB.

Overall A well-featured but expensive motherboard *Simon Crisp*

ECS RS485M-M motherboard

Price £43.06 **Contact** www.pcnextday.co.uk **Overall** ★★★★☆

Built on a MicroATX PCB and around AMD's AM2 Socket, the RS485M-M uses ATI's Xpress 1150 chipset supporting AMD Athlon64 FX, Athlon64 X2, Athlon64 and Sempron processors.

It's a mobile chipset and therefore has some useful power conservation features built in, enhanced by the passively cooled Northbridge and Southbridge. Add in one of AMD's Energy Efficient CPUs and you have a high-performing and very quiet motherboard.

The integrated graphics core is based on ATI's Radeon X300, which runs at 300MHz and shares up to 256MB of the system memory. To upgrade there's also single x16 PCI Express graphics slot.

Overall An ideal base for a budget home-theatre PC *Simon Crisp*

Logitech V450

Price £39.99 **Contact** www.logitech.co.uk **Overall** ★★★★★

As with most Logitech mice, the V450 uses a laser instead of an optical beam. Although few will appreciate the increased accuracy, it does mean that, unlike with optical mice, you can use it on uneven surfaces such as carpet – something that will come in handy if you're using your notebook away from a desk.

Four pads help the V450 glide smoothly while the tilting scroll wheel will be useful when viewing web pages on a small notebook screen.

The small USB 2.4GHz wireless receiver stows away in the underside of the mouse and no software installation is required. Two AA batteries power the mouse and Logitech claims it will keep going for up to a year.

Overall A great travel mouse ideal for notebook users *Will Stapley*

Terratec Cinergy T USB XE

Price £34.06 **Contact** www.terratec.co.uk **Overall** ★★★☆☆

The Cinergy T USB XE is smaller than a highlighter pen, plugs into a USB port and gives you access to free-to-air digital TV channels on your PC.

The 12cm antenna didn't pick up a single channel. Plugging the Cinergy into a wall-mounted socket connected to a roof aerial gave better results, but still fell well short of the full complement of available channels.

In use the Cinergy's performance was choppy. Even without time-shifting engaged during normal TV viewing, CPU usage was averaging well over 50 per cent, which rules out the idea of watching digital TV while you're doing anything else that requires a decent amount of your computer's processing power.

Overall Good with a powerful PC and a strong signal *Ken McMahon*

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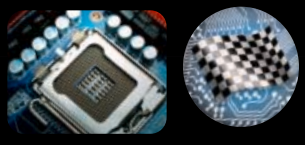

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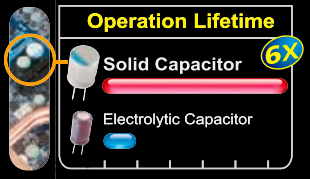

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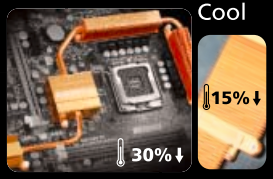

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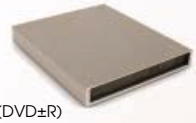

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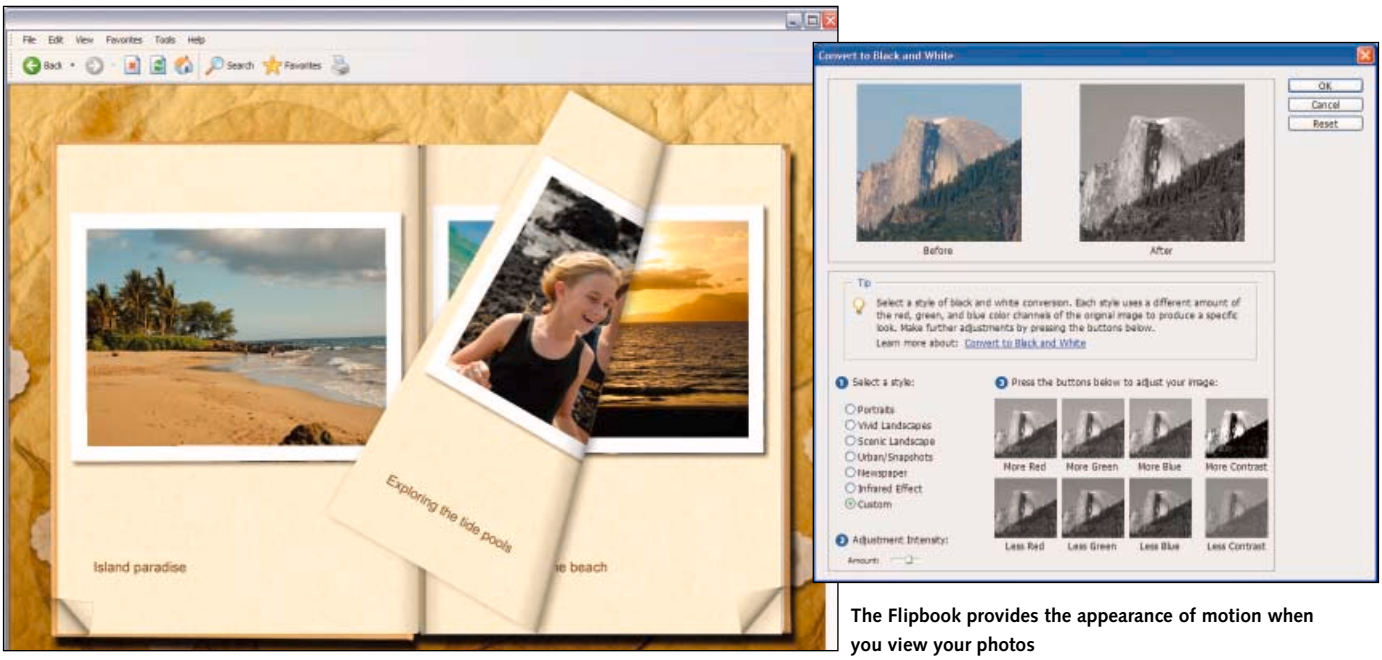
PHOTO EDITING

Adobe Photoshop Elements 5.0

A solid, if unspectacular, upgrade to Adobe's popular photo editor



The Flipbook provides the appearance of motion when you view your photos

At first glance this version of Elements is a little disappointing. Previous upgrades to this low-cost photo-editing program have offered a variety of eye-catching special effects and powerful editing tools.

The new features in Photoshop Elements 5.0 don't have that sort of attention-grabbing visual flair but, on closer inspection, they do turn out to be pretty useful.

There are a few new editing tools available, but they're mainly corrective options that will appeal to fairly experienced photographers. The Correct Camera Distortion filter allows you to correct lens distortions or perspective problems. It's useful, but you'll need to know your way around your camera pretty well and to understand technical terms such as pincushion and barrel distortion in order to use it properly.

The same thing applies to the new Colour Curves command. This allows you to fine-tune the exposure of your photos by adjusting settings such as contrast, backlight, shadows and midtones. The Colour Curves dialogue box provides you with a series of previews that show how different settings affect your photos, so you don't need to be an expert in order to simply select whichever preview looks best. Again, though, an understanding of how tone curves work would help if you're going to get the best out of this feature.

Most of the other new features focus on organising your photo collections and sharing them with others. That doesn't sound terribly exciting, we know, but there are some useful things here.

Previous versions of Photoshop Elements included Stacks, which allow you to group a set of photos together – perhaps stacking together a series of photos of the same person or scene. The Stacks feature has been improved so that Elements can scan through your photo collection and automatically stack visually similar photos. This is a good way of quickly organising a large collection of photos, and the program can show you which photos it wants to stack together so you can override its selections if you want to.

There's also a special type of stack called a Version Set. When you edit a photo you can group the original photo in a stack along with any edited versions of that photo. This allows you to experiment by editing a photo in various ways, while still keeping all the different versions of the photo neatly stacked along with the original photo.

We also like the Creations tool, which allows you to create your own customised collages and other types of documents. A few months ago, Adobe bought Macromedia (see **www.pcw.co.uk/2127159**), the company that developed the Flash animation software used on so many websites. This has allowed Adobe to add some Flash-based animation features to Elements, such as the ability to create a Flipbook that quickly plays through a series of photos to create the appearance of motion.

You can also create interactive collages of photos to put onto your personal website. These allow other people to click on the photos on a web page and move them around or to zoom in on individual photos. It's pretty impressive stuff, although some of the templates and themes are pretty cheesy.

Photoshop Elements 5.0 may not have the same wow factor as previous upgrades, but its new features will quickly earn their keep by making it easier to work with large photo collections and to create impressive photo projects that you can share with your family and friends.

Cliff Joseph

Details

Price £69.99
Best price www.pcw.co.uk/bestprices
Contact Adobe www.adobe.co.uk
System requirements 1GHz processor • 512MB Ram • 1.5GB hard disk space • Windows XP

Verdict

Pros Improved features for organising large photo collections; good for sharing photos with friends
Cons No spectacular new features; high system requirements

Features ★★★★☆
Ease of use ★★★★☆
Value for money ★★★★★

Overall A powerful and versatile photo-editing program at an attractive price

★★★★☆

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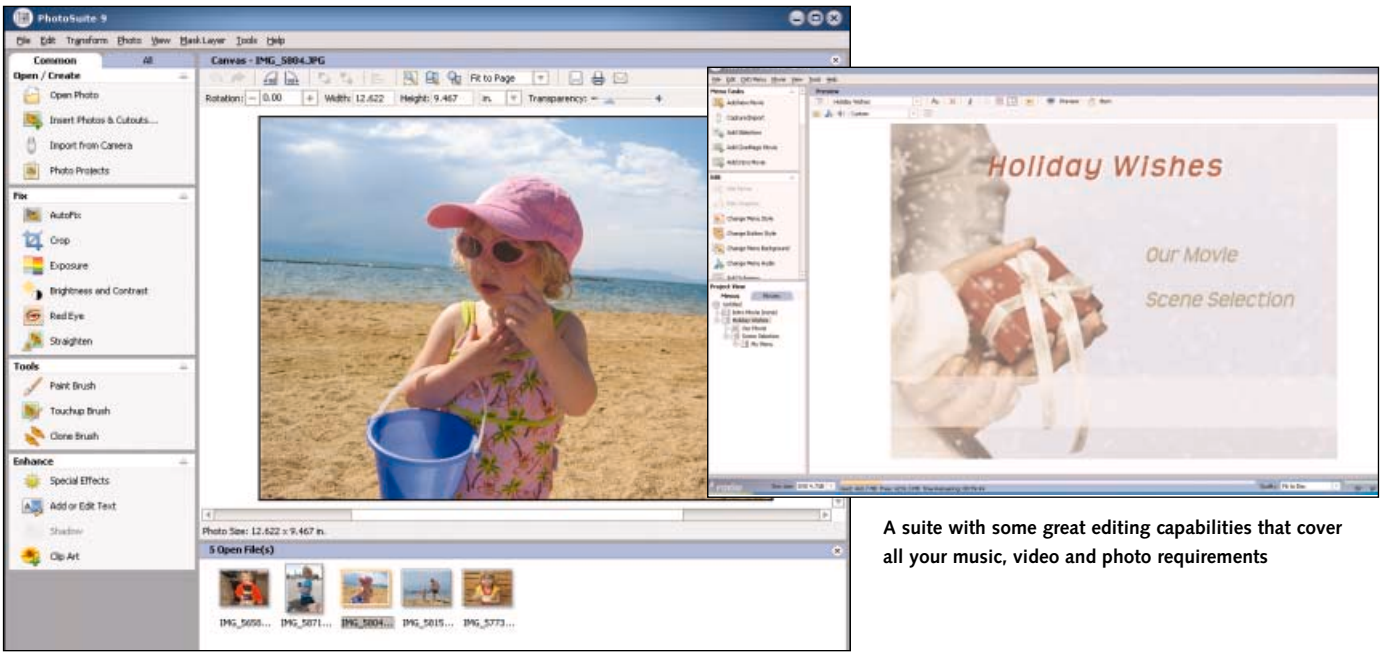
CREATIVITY SUITE

Roxio Creator Suite 9

Personal Computer World RECOMMENDED

One software suite for every multimedia task under the sun



A suite with some great editing capabilities that cover all your music, video and photo requirements

Roxio Creator Suite 9 is less of a whole new product and more a general smartening up. The Home utility is still the first port of call for using the software. It is task-led and doesn't expect you to know which application to use. This is by no means a bad thing, not least because of some less-than-helpful program names. It is still possible to show a list of programs. The Home screen also now reads internet pages from Roxio with news of products or updates.

Roxio is quick to point out that Blu-ray support is now built into Creator, so you can take advantage of the bigger capacities as and when new drives are made available. Blu-ray is not restricted to high-definition video – the extra capacity can be used for backups and data projects. HD-DVD support isn't available yet, but is planned to be released as a patch in the future.

As nothing has been taken away since the previous version, you can read a good overview of the basics in our review of Creator Suite 8 (**www.pcw.co.uk/2146378**).

Creating an mp3 DVD is not new to Creator but the DVD Music project now has a random play option. This is ideal for background music, as a DVD can hold many hours of music in mp3 format. A more advanced version of this, the Automix, can automatically generate playlists based on the mood of a song.

Capturing audio has been made easier with automatic record in the Sound Recorder program. It buffers a set time before the Record button is pressed, which makes it less critical to have fast reactions.

The Mute System Sounds option prevents sounds from other applications such as notifications ruining recordings. An Autopause tool helps to save hard disk space when making unattended recordings. This senses periods of quiet and pauses recordings.

The Disk Copier utility has a lot more to it than the name suggests. As well as copying discs and burning ISO images, it can be used to convert video for a variety of devices, including Video iPods and PSPs. At times the Disk Copier feels like a dumping ground for features that didn't fit anywhere else. A renaming of the section might make it clearer. For example, you wouldn't expect to find video conversion tools in the Disk Copier section.

Some of the projects defaulted to the Roxio format when saving a disc image, rather than the standard ISO. This might be a problem when sharing projects, so it's something to watch out for.

One improvement to the MyDVD section is the greatly increased number of menu styles. Previous versions were rather limited and the extra styles give you far more to choose from. Roxio also sells extra themes in batches of five for about £25.

Roxio Creator Suite also comes with Media Manager for organising all kinds of media on a computer. It can import images from compatible mobile phones, which is ideal for anyone who values the pictures taken with their camera-phone, and there is also a tool for creating panoramas.

Tagging mp3 files can be a frustrating task, especially if there was incomplete data when the files were ripped. The Media Manager can be used to update these tags; the latest service from Gracenote uses audio footprints to identify music tracks, which is particularly useful for tracks recorded from tape or LP.

If you're looking for something to handle all your digital media needs, you'd be hard pushed to find anything as easy to use and comprehensive as Creator 9.

Tim Smith

Details

Price £60
Best price www.pcw.co.uk/bestprices
Contact Roxio www.roxio.com
System requirements 500MHz processor (faster required for video applications) • 256MB Ram • 1GB minimum hard disk space • Windows XP/2000

Verdict

Pros Covers all aspects of music, video and photos; advanced editing capabilities
Cons Some useful tools hidden in Disc Copier; no massive updates
Features ★★★★★
Ease of use ★★★★☆
Value for money ★★★★★
Overall Just as Office takes care of all word processing needs, Roxio Creator 9 is the complete multimedia package
★★★★★

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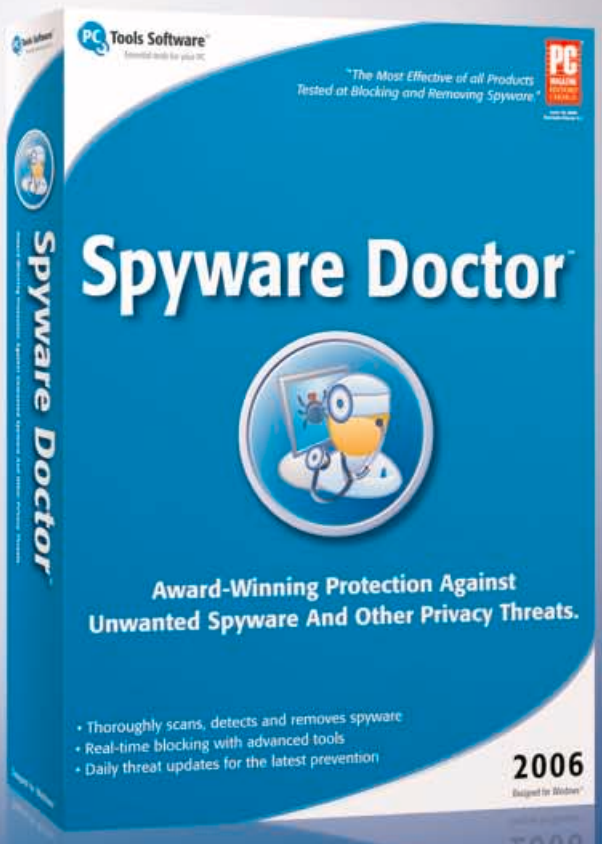

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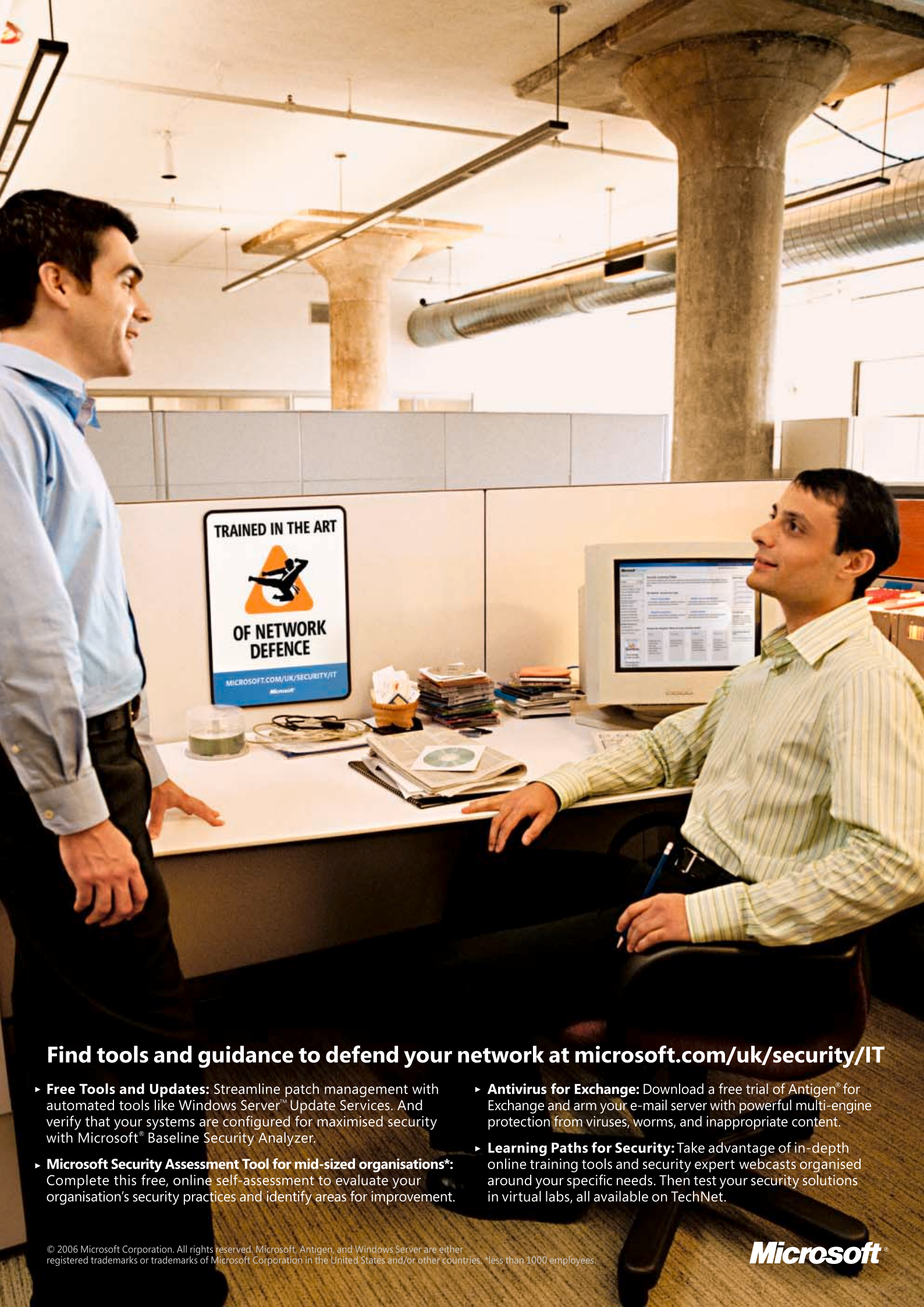

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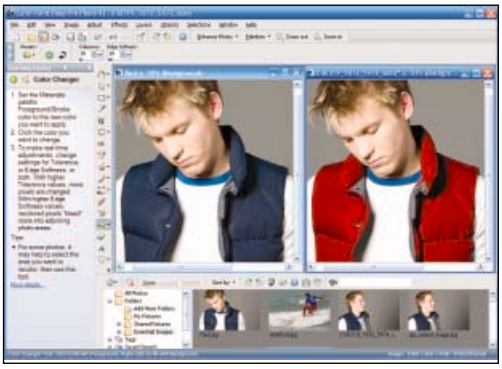
PHOTO EDITING

Corel Paint Shop Pro Photo XI

This aging photo editor can still spring a few new surprises



With the word Photo clumsily grafted onto the end of its name, Paint Shop Pro Photo XI is a solid upgrade for this veteran image-editing program. None of its new features are as innovative as Corel claims, but they do work well and provide some powerful editing tools that are also easy to use.

The redesigned browser window, for example, is hardly unique. After all, most photo editors have some sort of browser that allows you to quickly view and sort through your photos.

However, Corel's version of the browser can be positioned as a strip that runs along the bottom of the screen, rather than as a separate window that occupies the entire workspace. This allows you to quickly skim through your photos at the same time as working on a photo in the main workspace.

The Picture Trays option allows you to gather small groups of photos that might belong to a specific project such as a slideshow. The Color Changer allows you to quickly change the colour of objects such as items of clothing. It isn't unique, but you'd have to pay more than £500 to get a comparable feature in Adobe's Photoshop.

There are some new effects and filters, including the ability to reproduce photo-processing techniques from the past, such as a box camera from the 1900s.

The list of completely new features is relatively short though, so this isn't a massive upgrade. However, the software does provide some powerful editing tools at a competitive price.

It's not the cheapest photo editor available, but Corel's Paint Shop Pro Photo XI is a good choice for people who want to go beyond the basics and do more than just correct simple flaws such as the dreaded red-eye. *Cliff Joseph*

Personal Computer World RECOMMENDED

Details

Price £90.50
Best price www.pcw.co.uk/bestprices
Contact Corel www.corel.co.uk
System requirements 500MHz processor • 256MB Ram • 500MB disk space • Windows 2000/XP

Verdict

Pros Powerful photo-editing tools
Cons More expensive than other consumer-oriented editors
Features ★★★★☆
Ease of use ★★★★☆
Value for money ★★★★☆

Overall A good upgrade, although it won't worry Adobe and its Photoshop Elements too much

★★★★☆

AUDIO EDITING

Ableton Live 6

Advanced looping and recording software

The previous version of this DAW (digital audio workshop) software, Ableton Live 5, is already such a mature and well-crafted product that it's hard to see what improvements could be made.

However, the new version retains all the unique character of the earlier product, while adding some powerful new features, such as multi-core and multiprocessor support, sound-to-picture Quicktime movie import and a new sound library – The Essential Instrument Collection. New, improved devices include EQ 8 and a Dynamic Tube Simulator and Saturator for adding warmth and dirt.

In use, version 6 initially looks much like the previous versions, with the familiar minimalist 2D graphics in two views for Arrangement or Session.

A deep-freeze feature helps minimise CPU load, but cleverly without losing the ability to use the majority of editing features for that track while frozen. There is also the option to flatten frozen tracks into audio.

Instruments and effects can now be grouped in Racks. These can be saved and recalled along with a simplified set of controls for tweaking the sound.

Sampler is described as the big brother of its predecessor Simpler. It allows multi-sample playback, in-depth manipulation of sampled sounds and imports a wide range of sample formats.

New project management tools help with organisation, transfer and archiving projects. Live sets, Live clips, Racks, presets and the audio samples and movie files they use can be organised into project folders.

If you have any involvement in using computers to record and create music, particularly in live performance, you shouldn't be without Ableton Live 6. If you have a previous version, version 6 is definitely worth the price of the upgrade. *Terry Relph-Knight*

Personal Computer World RECOMMENDED

Details

Price £369.42 (upgrade options available)
Best price www.pcw.co.uk/bestprices
Contact Ableton www.ableton.com
System requirements 1.5GHz processor or Apple Mac G3 • 512MB Ram (1GB recommended) • Windows 2000/XP, Mac OSX 10.2.8

Verdict

Pros Innovative and well-designed user interface; space and resource efficient; easy-to-use, powerful DAW
Cons Limited mixer bussing; no surround-sound support
Features ★★★★★
Ease of use ★★★★★
Value for money ★★★★☆

Overall Although based on the ideas of Dance and DJ music with their use of loops, Ableton Live 6 can easily be applied to all sorts of new musical ideas

★★★★★

DISK UTILITY

VCom Partition Commander Professional 10

Take full control of your hard disks

Partition Commander Professional 10 is far more capable at dealing with partitions than the Disk Management tool built into Windows.

It can be installed on Windows 2000 and XP Home and Professional but not the Server versions. It won't work at all if a server operating system is installed.

The interface is uncluttered. The left-hand side of the window details the list of available tasks. The bottom half of the main window shows the physical disks installed, with the remainder providing information about individual partitions. Different formats are colour coded.

Unlike Windows Disk Management, Partition Commander can recognise partitions formatted for Linux. Linux newcomers can set up their hard disk ready for the Linux installation from within Windows.

The basic tasks of creating and deleting partitions are easy enough to master. Partition Commander comes into its own with more advanced tasks, such as moving or copying partitions. They can also be merged if you decide separating files is an inefficient use of disk space.

If you are planning to upgrade a hard disk the copy partition utility will be very useful. Moving a 20GB Windows partition onto a new 80GB disk only took about 20 minutes without a restart required. Once the copy was finished, the new disk booted perfectly.

The Volume Explorer shows the contents of a partition and is a useful way to double check which partition is which. Finally, the Partition Commander CD is bootable and can be used to rescue disks when things go badly wrong.

This utility won't be used every day, but when it is, it will more than justify its cost. The copy partition feature alone makes it a must-have when upgrading a main boot disk. *Tim Smith*

Details

Price £30
Best price www.pcw.co.uk/bestprices
Contact Avanquest www.avanquest.co.uk
System requirements Windows 95/98, ME, 2000 Pro, XP • Internet Explorer 5 or higher • 300MHz Pentium or higher • 128MB of Ram • 50MB hard disk

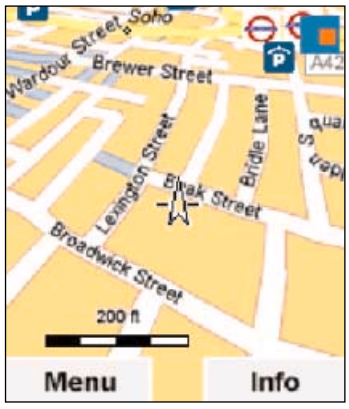
Verdict

Pros Simple to use; makes otherwise complicated tasks simple
Cons Not an everyday utility
Features ★★★★☆
Ease of use ★★★★☆
Value for money ★★★★☆
Overall A essential utility for anyone customising the partitions on their computer
★★★★☆

MAPPING SOFTWARE

Map24 Mobile

Street-level maps on your mobile, but watch out for those data charges



There are plenty of options for satellite navigation on your mobile phone but, as well as being expensive, they all require you to carry around a Bluetooth GPS receiver that needs to be recharged along with your phone. If you're trying to get from A to B but know your immediate location, Map24 Mobile is a decent alternative.

Compatible with Pocket PCs and the majority of smartphones currently on the market, Map24 Mobile is a free service and can be downloaded from the Map24 website. It does, however, require internet access via your phone, so you'll be at the mercy of your network operator's data charges. A handy data counter can be displayed on screen to help keep track of these charges.

We tested it out on a Nokia N70 and, despite the small screen size, the map was very clear and easy to read. Working in much the same way as Map24's web service, you can fly over the map, zooming in and out at will.

Although getting to grips with the controls takes a while, the map itself scrolls extremely smoothly. It's also possible to route from one point to another; you then scroll down through the written directions with the map, updating on each button press.

Map24 Mobile is a useful application to have on your phone and works extremely well. The fact that the application is free is a bonus, but in just a few minutes we managed to rack up a data transfer of around 150KB; use it for extended periods of time and you'll find a nasty surprise waiting for you in your next mobile phone bill. Of course, if you've got a hefty data allowance included in your monthly mobile plan, this won't concern you too much. *Will Stapley*

Details

Price Free
Best price www.pcw.co.uk/bestprices
Contact Map24 www.map24.com
System requirements Pocket PC/Smartphone • Internet access

Verdict

Pros Smooth mapping; good range of features; free application
Cons Leaves you at the mercy of mobile network data charges
Features ★★★★☆
Ease of use ★★★★☆
Value for money ★★★☆☆
Overall Works well and is a good application to have on your phone, but data charges will put people off
★★★★☆

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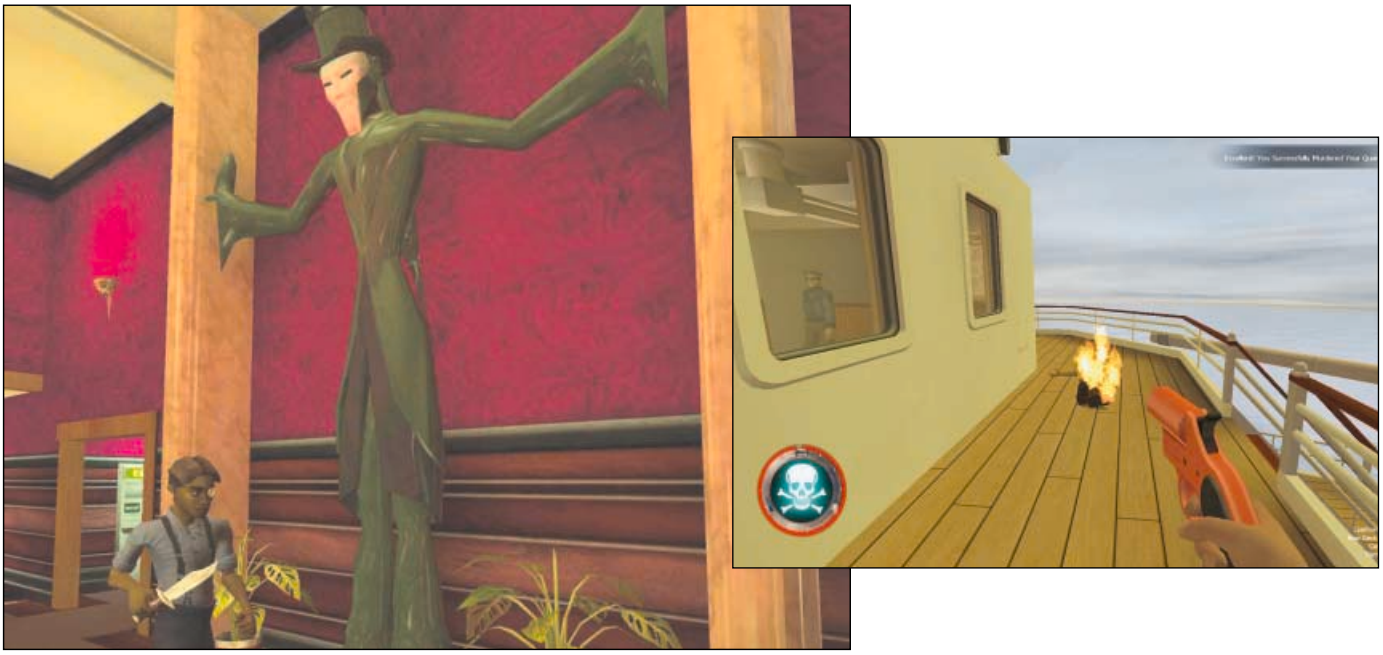
All aboard for a spot of multiplayer murder-mystery mayhem on the high seas



The Ship may have started life as a Half-Life 2 mod, it might have a budget price and it may be available via the Steam online distribution service (as well as CD-Rom), but none of these facts should in any way lead you to conclude that it's less of a 'proper' game than most of the other releases cluttering the shelves at your local games emporium.

It's possible that The Ship holds more innovation in its little finger than any number of the thinly disguised Half-Life clones you might encounter elsewhere.

Rather than heading directly down the obvious first-person shooter path, the game's developers have blended in an intriguing murder-mystery element.

The game is set on board a 1920s-style cruise liner owned by the mysterious masked Mr X. While at sea, Mr X casually informs all aboard that they are, in fact, about to take part in a grisly game of life and death, apparently for your malevolent host's amusement.

Each passenger is assigned a fellow traveller as a target who must be hunted down and bumped off. Not only do you have to take care of your own victim, but you must also keep your eyes peeled for the unknown assassin who's been tasked with taking you out.

Unlike most shooters, you're not supposed to run about aimlessly blowing away everything in sight. In fact, you mustn't be seen by either another passenger, crew member or on a security camera committing any acts of violence at all. Being caught carrying an illegal weapon is enough to get you banged up in the brig.

Standard shooter weaponry, such as guns and knives, is available but your mysterious masked benefactor encourages use of more imaginative arms – screwdrivers, letter openers and the like – rewarding you with bigger cash bonuses if you do so.

Complicating matters yet further is the game's 'needs' system, which basically simulates the ongoing requirements of your character's bodily functions. During the game you'll need to eat, drink, sleep and use the toilet or risk the embarrassing and sometimes fatal consequences.

The combination of these unique gameplay elements helps The Ship to stand head and shoulders over the competition in terms of originality. And it's fun to play, too – with some distinct caveats.

As a single-player game, for example, The Ship is a bit of a dead duck. Despite attempts at both a Story Mode and a quick-action Arcade Mode, it turns out that running around murdering computer AI-controlled characters is a strangely empty experience. The game really comes into its own in online multiplayer mode, where both your would-be victim and assigned assassin are controlled by real, live players.

Graphically the game looks a little dated and basic with lots of big, blank texture-free surfaces and similar environments. The developers have made up for this by employing a fun cartoon style for character design.

If you're into multiplayer gaming and getting a bit bored with capturing flags or deathmatching, The Ship will be a refreshing change from the norm. The amount of fun you get out of it will largely be dictated by whom you play it with. In our time with the game we encountered more than a few annoying killjoys who decided it was more fun to go postal and turn the game into a bloodbath rather than sticking to the rules.

Most of the time, however, The Ship is an extremely entertaining spin on the online shooter, with boat-loads of black humour and a high degree of innovation.

Jonathan Parkyn

Details

Price £19.99
Best price www.pcw.co.uk/bestprices
Contact Outerlight
www.theshiponline.com
System requirements 1.8GHz processor • 512MB Ram • 1.5GB hard disk space • Windows 98/ME/2000/XP

Verdict

Overall **Don't be put off by The Ship's budget price and humble Half-Life mod origins – it's a flawed but highly enjoyable multiplayer experience with plenty of originality on board**

★★★★☆

3D SHOOTER

Battlefield 2142

Futuristic first-person shooter from EA's favourite online franchise

When Lucasarts effectively 'borrowed' EA's Battlefield 1942 formula and transposed it wholesale from its World War II setting to a galaxy far, far away (cunningly changing the name from 'Battlefield' to 'Battlegrounds' so no-one would notice), it was only a matter of time before EA retaliated with its own space-age version of the game.

Well, Battlefield 2142 (see what they did there?) takes EA's franchise into the 22nd century all right, but adds surprisingly little else as a result.

The setting is the Earth's second ice age and the super-powers of the European Union and the Pan-Asian Coalition are locked in a struggle for survival – or something like that. What Battlefield 2142 offers is an excuse to jump into some heated first-person combat on a large scale. As such, it delivers pretty much what you would expect.

As usual, this is for multiplayer fans only. It is possible to play through a selection of 2142's maps in single-player mode against bots of varying difficulty levels, but going it alone isn't much fun and is probably only worthwhile for those wishing to hone their Battlefield skills before taking the fight to the online front.

There are a handful of futuristic vehicles to command (including the blatantly *Star Wars*-esque bipedal Walker) and plenty of high-tech weaponry. The maps are as detailed and varied as ever, too.

Graphics look fairly similar to those of last year's Battlefield 2, despite the sci-fi setting. In fact, the whole game feels fairly familiar, which is not necessarily a bad thing. The Titan Mode is probably the closest thing to innovation, which is a variation on the Conquest Mode theme that involves taking out an enemy mothership. For the most part, however, this is more of the same dressed up in vaguely futuristic clothing. *Jonathan Parkyn*

Details

Price £34.99
Best price www.pcw.co.uk/bestprices
Contact EA
http://battlefield2142.ea.com
System requirements 1.7GHz processor • 512MB of Ram • 2.2GB hard disk space • DVD-Rom drive • internet connection • Windows XP

Verdict

Overall **There's nothing particularly surprising or different about this Battlefield update, but that doesn't stop it from being one of the best online shooters around**

★★★★☆

REAL-TIME STRATEGY

Joint Task Force

Get tanked up and take on the terrorists with this strategic take on modern warfare

According to the makers of Joint Task Force, the global situation in 2008 will be so bad the West will need to form an underfunded international military unit to tackle the world's danger spots.

Despite its unconvincing premise, however, this real-time strategy title has its heart in the right place. The typically daft backstory serves as a pretext to enjoy some war games based on modern military engagement, rather than the obligatory period setting usually favoured by games of this type.

It's fun to get tactical with F-117A stealth bombers and M1A2 Abrams tank units. The game's graphics looks pretty good, with impressively high levels of detail.

In terms of gameplay, Joint Task Force sticks pretty closely to the RTS (real-time strategy) rulebook. You're given a set of objectives to accomplish, exploring a map in the process and engaging the enemy where necessary. The one exception here is that you won't find yourself doing much in the way of building bases and gathering resources. Joint Task Force reduces this aspect to a largely financial level, providing you with cash rewards you can then use to purchase reinforcements, additional units and vehicles.

An interesting spin on things is the way that the media plays a role in proceedings. Accidentally wipe out any civilians while you're engaging the enemy, for example, and you'll be faced with widespread public disapproval and, possibly, reduced funding as a result.

Barring minor AI issues, Joint Task Force is a pretty compelling strategy game. Standard online and Lan multiplayer head-to-head and co-op options are available. It's not quite the perfectly-balanced RTS masterpiece that is Company of Heroes (see **www.pcw.co.uk/2165389**), but at least Joint Task force brings the strategy genre up to date. *Jonathan Parkyn*

Details

Price £34.99
Best price www.pcw.co.uk/bestprices
Contact Vivendi
www.jointtaskforce.com
System requirements Pentium 4 2GHz or AMD Athlon XP200+ processor • 512MB Ram • 2.5GB hard disk space • DVD-Rom drive • Windows 2000/XP/XP x64

Verdict

Overall **Not the greatest RTS game this year, but a solid enjoyable slice of modern combat action that features one or two clever ideas**

★★★☆☆

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Personal Computer World

vnu labs

How we test

Performance testing is an important part of PCW's reviewing process and to obtain our authoritative results we use the UK's best PC testing resource – VNU Labs. Here we explain why you can trust our results and give you a tour of our most frequently used benchmark programs.

One of the main reasons people upgrade their PCs is because their old model seems 'too slow'. But how do you tell whether the one you're going to replace it with is any faster? At *PCW* we take PC testing very seriously and we have the UK's best PC testing labs – VNU Labs – on tap to help us give you reliable, authoritative performance figures, to help you with your purchasing decisions.

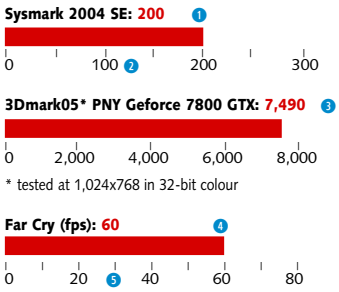
It's true that speed isn't everything, but it's an important part of the buying equation, especially when there are so many components out there. As many of our PC group tests are based on price bands, checking the performance is even more important – if the core system is underperforming, you need to know before you part with your hard-earned cash.

In VNU's UK Labs, which is part of the European VNU Labs network, our staff have over 20 years of combined testing experience. We know all the perils and pitfalls of practical benchmarking and we contribute to the development of industry-standard benchmarks through our full membership of Bapco (www.bapco.com), the non-profit benchmark consortium. We are also a media member of the Futuremark Benchmark Development Program (www.futuremark.com). Listed below are the main benchmarks we use for testing PC systems and components.

- Bapco Sysmark 2004 SE – an application-based benchmark that tests real-world system performance.
- Futuremark 3Dmark03 – a 3D graphics benchmark designed to test the performance of DirectX 8 graphics cards.
- Futuremark 3Dmark05 – the latest version of 3Dmark that tests DirectX 9 3D graphics performance.
- Ubisoft Far Cry – we use the Fort level timedemo to see how graphics cards perform in a real DirectX 9 game.
- Futuremark PCmark05 – a synthetic benchmark used to test the performance of a PC's major subsystems.
- Bapco Mobilemark 2005 – used to assess the battery life of notebooks using real-world applications and usage scenarios.
- Test beds – we use standardised AMD and Intel-based test rigs to test components and peripherals.

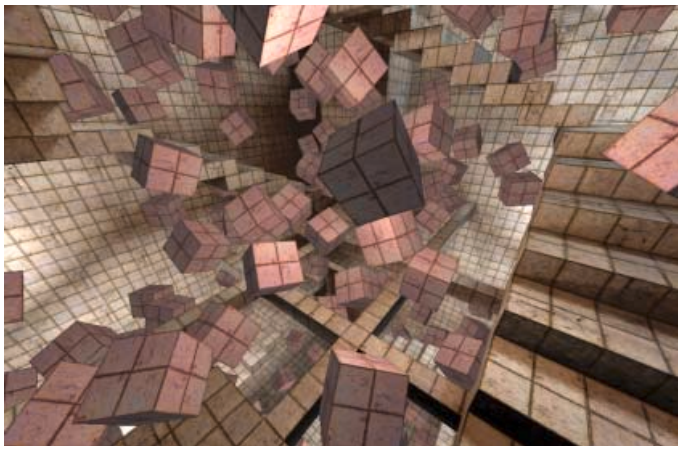
There's more information about our testing procedures and benchmarks on our Labs site at www.reportlabs.com/testbed/bguides/benchmarks.php.

Performance



1. A score of 200 indicates that the system is twice as fast as the reference PC
2. The reference PC (2GHz P4 512MB of Ram) scores 100
3. A Geforce 7800 GTX would score in the region of 7,490
4. A score of 60fps (frames per second) or higher is most desirable
5. A result of 30fps or above means the machine can produce playable frame rates at the tested resolution

Far Cry is a real-world DirectX 9 test



PCmark05 measures memory, processor, graphics and hard drive performance

3Dmark05 pushes modern graphics cards to their limits

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Double take

Intel's Core 2 Duo processor is now available in a variety of mobile flavours. Luke Peters sees how tasty those at the bottom of the food chain are

Intel's new Core 2 Duo processor is finding its way into more and more systems, and thanks to the new design it's as suitable for laptops as it is for desktops. As its name suggests, the new architecture has two cores that, in theory, should boost multitasking performance while reducing power consumption by around 28 per cent. It also allows better performance at slower processor clock speeds, potentially giving notebook computers more battery life.

Like all new processor releases, the mobile Core 2 Duo comes in a number of flavours. At the bottom of the range is the T5500, with 2MB of Level 2 (L2) cache, 667MHz front-side bus (FSB) and a 1.66GHz clock speed, while at the top there's the T7600, which boasts a whopping 4MB L2 cache, 667MHz FSB and a 2.33GHz clock speed.

For this month's group test, we asked seven manufacturers to supply their cheapest Core 2 Duo notebook aimed at entry-level buyers. It'll be no surprise, then, that the T7600 chip doesn't feature at all in this test. However, a couple of manufacturers did use surprisingly high-powered components in these low-cost systems.

The systems on test range in price from £669 to £1,199, so there's something to suit every pocket and lifestyle, whether you're a hardened road warrior looking for a solid business system or a discerning home user who wants to move to the next level of mobile power.

ON TEST

110 **Asus F3Jv**
111 **Evesham Voyager C530**
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117 **HP Compaq NX7400 (RH393ET)**
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Editor's Choice

'There's something to suit every pocket and lifestyle, from business systems to laptops that'll move you to the next level of mobile power'

Asus F3Jv

Personal Computer World RECOMMENDED

Price £1,199 **Contact** http://uk.asus.com

Unsurprisingly, the most powerful notebook here is the also the most expensive. At £1,199, the Asus F3Jv costs almost twice as much as the cheapest, the HP, so a key question is whether the extra money offers an equal amount of value.

The F3Jv is built around one of the fastest mobile processors on the market today, Intel's Core 2 Duo T7200, which runs at 2GHz and has a whopping 4MB of L2 cache. The Asus also comes with 2GB of fast DDR2 memory, which made for some lightning-quick results in our benchmark tests.

Running Sysmark 2004 and PCmark05, which test how fast a computer operates in Windows and running a wide range of software applications, the Asus scored 263 and 4,751 respectively, streets ahead of the other systems in this group.

Graphics performance was also impressive for a non-gaming notebook, with the popular 256MB Nvidia Geforce Go 7600 chipset achieving a score of 3,203 in 3Dmark05 and a frame rate of 79.21fps in Far Cry.

The F3Jv runs Windows XP Professional rather than the Media Center Edition. The 100GB Sata (serial ATA) hard disk is adequate rather than generous, though if storage space is looking a bit stretched, there's a multiformat DVD writer to archive files and free up some space. There's a gaggle of USB ports too, for attaching external hard disks or removable media.

Integrated into the lid of the notebook is a 1.3-megapixel webcam and a microphone, which can be used with videoconferencing services such as Skype and saves having to carry around extra equipment.

The 15.4in WSXGA+ screen is one of the best here, displaying vibrant colours and lots of detail at its maximum resolution of 1,680x1,050. Asus also equips the F3Jv with its 'Splendid Video Intelligence' technology. In English, this improves contrast and brightness and making skin tones appear more natural, which is evident when watching DVD movies; more than just a gimmick, we think.

Like all the notebooks here, 802.11g wireless networking is included as standard, and the F3Jv also has a Bluetooth adapter. Other plus points include the DVI port and an Express Card slot for adding expansion devices such as TV tuners when they eventually start to appear in this format.

Using the Asus is a pleasant experience; the keyboard is well laid out, the keys aren't too springy and there's plenty of wrist space when typing. The trackpad is also quite big and the long strip below serves as both left and right buttons, which looks pretty chic.

Design-wise, the F3Jv is up there with the best-looking on test. Although it's quite big and weighs 3kg excluding adapter, the smooth lines and delicately rounded corners make it look rather slim.

At two hours, 19 minutes, however, battery life is a bit of a disappointment and doesn't really do anything to support Intel's claim of improved battery life for the Core platform – but there again, it's perhaps unfair to expect the CPU to compensate for other power-hungry components such as the large, bright TFT display.

Bundled software is comprehensive and includes Cyberlink Power Director, Norton Internet Security 2005 and Nero Express 6, as well as a whole host of Asus-developed tools and features, which are preloaded on the machine. Asus also offers a two-year return-to-base warranty.

Verdict

Pros Fast processor; loads of memory; fantastic screen
Cons Poor battery life; expensive

Features	★★★★☆
Performance	★★★★★
Value for money	★★★☆☆

Overall A cracking Core 2 Duo notebook that takes full advantage of the new architecture, but at a price

★★★★☆

Evesham Voyager C530

Personal Computer World EDITOR'S CHOICE

Price £849 **Contact** www.evesham.com

Pitched against stylish designs such as the Asus and Sony in this group test, the Evesham Voyager C530 isn't that enticing to look at. Its sturdy, square design won't attract the style-conscious and the plastic, metallic tone throughout suggests that grey has finally become the new beige.

However, looks can deceive, and you can always count on an Evesham to provide excellent performance for the money. At a clock speed of 1.83GHz, the T5600 may not be the quickest Core 2 Duo processor here but Evesham's engineers have managed to use it to full effect. With 1GB of Corsair DDR2-677 memory to help, the Voyager C530 managed some of the best test results, which also shows just how much of a difference having that extra core makes.

Scores of 225 in Sysmark and 4,310 in PCmark05 are impressive and allowed us to fly through a number of simultaneous software tasks without any sign of faltering. For instance, we ripped a music CD to mp3, touched up our holiday photos and had music playing in the background, without any glitches or slowdowns.

Its graphical prowess was also among the best here, scoring 3,431 in 3Dmark05 and 66.62fps in Far Cry, which is impressive for a notebook of this price and looked great on the robust 15.4in WXGA X-Bright widescreen display. Undoubtedly this is due to the ATI Mobility Radeon X1600 chipset, which has 512MB of its own dedicated graphics memory.

A 100GB Sata hard disk provides enough storage space to get going with the Windows Media Center operating system but we all know how hungry video files are; record too many episodes of *Robin Hood* and hard disk space soon gets gobbled up. Naturally, there's a recordable DVD writer built into the side and four USB sockets to attach external storage devices if things start to look tight.

The media centre theme is completed with a TV tuner, DVI for connection to external monitors, a digital audio output and memory card reader. An Express Card slot can also be found on one edge, as can a mini-Firewire socket.

The Evesham may be fast and feature-rich but all these components use a lot of power, and bring the total weight to 2.75kg excluding adapter. Running for just over an hour and a half before needing a recharge means you'll need to keep an eye out for power sockets.

The space surrounding the keyboard is pretty sparse, with just one shortcut button that puts the Evesham Voyager C530 into a battery-saving mode; a wise choice considering how poor its life is away from the mains.

In use, the Evesham is comfortable, with a plenty of space to rest your palms when typing. The trackpad has no scroll panels but, unlike other notebooks we've seen, is thankfully positioned directly below centre of the keyboard.

Software includes Microsoft Works 8, Roxio Easy Media Creator 7 (rather than the currently shipping version 9) and Bullguard Internet Security.

There's no 'Vista Capable' sticker in sight but it's unlikely to be short of the horsepower needed to run Microsoft's new operating system when it arrives.

Like all Evesham computers, the Voyager C530 comes with 24-hour online support and Big Fix for remote diagnostics. The warranty provides one-year on-site service and two years return to base.

Verdict

Pros Fast memory; DVI port; TV tuner and Media Center
Cons Poor battery life
Features ★★★★★
Performance ★★★★½
Value for money ★★★★½

Overall A great performer for the price and a wealth of entertainment features
★★★★★

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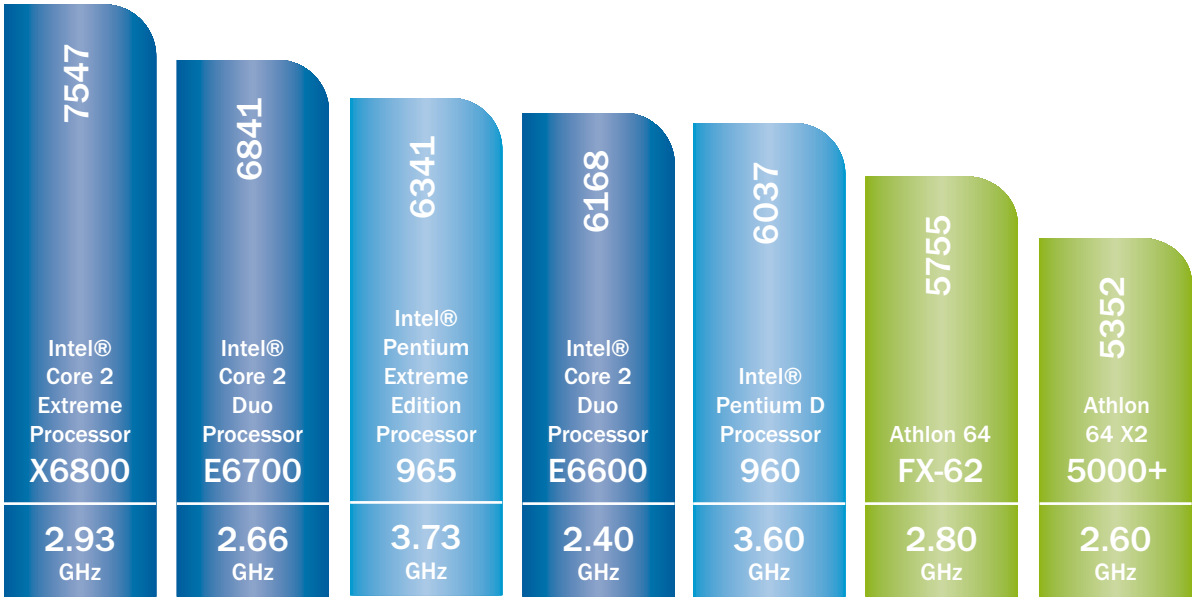

Source : http://www.tomshardware.com/2006/07/14/core2_duo_knocks_out_athlon_64/page16.html. This information was compiled using Tom's Hardware Guide CPU Charts 2005/2006 on 14th July 2006. The test set up, hardware and software configurations have been determined by Tom's hardware and may be viewed for these and similar comparisons by entering the respective processor names into this tool and clicking on the coloured bars produced.

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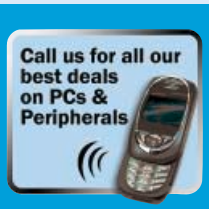

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"Intel regains the crown with Core 2 Duo" - cnet Reviews

intel Core 2 Duo inside

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Hi-grade Notino D7000-5500

Price £733.13 **Contact** www.higrade.com

Like the HP and Sony, the Hi-grade Notino D7000-5500 is one of only three notebooks here to use Intel's entry-level Core 2 Duo processor, the T5500. Running at a clock speed of 1.66GHz, on the face of it, it doesn't sound as if things have moved on much since the days of the Pentium, but with two cores to share tasks, the new processor can be much more efficient even at lower absolute clock speeds.

What does hold the Hi-grade back, however, is the mere 512MB of DDR2 memory fitted as standard, which is really far too little these days – 1GB is a minimum and 2GB preferred, especially if you're considering moving to Vista at a later date. However, if you're looking to jump on the Core 2 Duo bandwagon, the Notino D7000-5500 is a cheap way in.

While its benchmark result of 195 in Sysmark wasn't exactly groundbreaking, a score of 3,629 in PCmark05 makes it faster than the MSI and Sony notebooks, are both more expensive notebooks.

You'd think at this price Hi-grade would want to keep costs down. However, the £700 price tag buys you an 80GB hard disk, a multiformat dual-layer Sony DVD writer and Nvidia's Geforce Go 7400 graphics chipset with 128MB of dedicated graphics memory. However, the result of 1,856 in 3Dmark05 suggests that it will struggle when too much game detail is switched on. When the screen resolution was increased to 1,280x800, it scored 1,645, which will mean some nasty jerking and jittering.

The 15.4in WXGA widescreen is bright, sturdy and copes well at various viewing angles. Because of the way the lid is hinged to the back of the chassis, the display sits further down than most. We were ambivalent about how this affected our working, but didn't find it too much of a strain. However, for the best picture you need to be head-on and centred to the display, especially when watching DVD movies.

The chassis is home to a reasonable selection of connectivity options. As well as four USB ports, mini-Firewire, S-video, network, modem, and memory card slots, the Hi-Grade also has DVI and digital audio output sockets, and an 802.11g wireless networking adapter is built in.

It weighs 2.7kg excluding adapter, which is relatively portable, but unfortunately the battery life lets it down, as with a few others in this group test. When working with Windows applications it will need recharging after two hours, which isn't impressive, and neither is the one hour, 53 minutes you've got to watch a DVD before the battery goes flat.

Using the Notino D7000-5500 proved fairly comfortable and there's plenty of room to rest your palms while typing. The trackpad is a little small for our liking, especially with part of it reserved for document scrolling. Five shortcut buttons lie above the keyboard.

Clad in the same old metallic grey and plastic black, the Notino D7000-5500 won't win any awards for industrial design.

The software bundle includes Sonic Recordnow (for DVD burning), Sonic Cineplayer (for DVD playback), Bullguard Anti-virus (a three-month trial) and Open Office (free office suite).

The one-year collect-and-return warranty seems a bit stingy compared to some of the other offers here and you don't get much bundled software. However, there's no escaping the fact that the Notino D7000-5500 is a highly affordable entry into the world of dual-core computing.

Verdict

Pros Great value for money
Cons Poor battery life; slow processor; only 512MB of memory

Features	★★★☆☆
Performance	★★★☆☆
Value for money	★★★★☆

Overall At under £740, the Notino D7000-5500 is one of the cheapest ways to get into Core 2 Duo computing, but it does have some limitations

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HP Compaq NX7400 (RH393ET)

Price £668.57 **Contact** www.hp.com/uk

Notebooks from HP Compaq have impressed us over the past 12 months, not just in terms of price and performance, but also with their excellent battery life. The NX7400 may be by far the cheapest system on test here, but its ability to spend hours away from the mains makes everything else look seriously under par.

Clocking up an impressive three and a half hours before shutting down, the NX7400 may use cheaper, less powerful components than some here, but its capabilities as a portable computer are strong. Those who want a notebook for business, forgoing fancy multimedia features, are more likely to have battery life near the top of their list of requirements. To put it into perspective, in our Mobilemark benchmarks the HP Compaq lasted twice as long as the Rock and Evesham.

The secret of this Core 2 Duo notebook's low price of just £669 is in the components. The T5500 processor is the slowest that Intel has to offer, running its two cores at 1.66GHz. It features 2MB of L2 cache rather than the 4MB of more upmarket models, and an FSB of 667MHz, but it's still capable of running most software applications at perfectly acceptable speeds. A more salient point is the 512MB of Ram. This is the real killer for modern memory-hungry apps and operating systems and we'd recommend upgrading to at least 1GB (there's space for up to 4GB inside). HP claims the NX7400 is Vista Capable, so – with extra memory – it should be reasonably future-proof.

After chugging through our benchmark tests, the HP gave us scores of 198 in Sysmark and 3,065 in PCmark05. These were among the lowest scores in the group, with only the Hi-Grade performing slightly worse in Sysmark.

The 60GB hard disk is, again, below the average size in this group. In today's megabyte-hungry world, it won't keep you going for long, and even iPods now have bigger drives, so consider investing in an external storage device. What's also disappointing is the CD-RW/DVD combo drive. We thought these died out a long time ago, since most manufacturers have moved to dual-layer DVD recording. Again, the need for an external storage device becomes ever more apparent – but this is again indicative of the price.

The 15.4in LCD widescreen display is a decent size but it will only support a maximum resolution of 1,280x800. Intel's 950 graphics chipset can share up to 224MB of system memory if needed (although we'd hate to think what would happen to performance) but is nowhere near powerful enough to excite us with fast-moving 3D game graphics; a score of 464 in 3Dmark05 and a stuttering 8.12fps frame rate in Far Cry underline this.

On the connectivity front the NX7400 does the bare minimum, with three USB ports, VGA, mini-Firewire and a PC Card slot; there's no sign of DVI, digital audio or an Express Card slot.

In fairness to HP, the NX7000 is billed as a business notebook, so all-singing, all-dancing multimedia features are largely superfluous for a road-warrior's laptop. From the look and feel of point of view, the HP Compaq is comfortable to type on and use, but there's nothing to get excited about. The 2.6kg (excluding adapter) weight ticks the right box, though, as do the various business-oriented software protection tools and utilities that HP includes.

The standard warranty is one-year collect and return, with a further one-year warranty on the battery.

Verdict

Pros Cheap; lightweight; fantastic battery life

Cons Small hard disk; 512MB of Ram; limited connectivity

Features ★★☆☆☆

Performance ★★★☆☆

Value for money ★★★★☆

Overall A good choice for those who spend a long time on the road or just want a competent workhorse, but less attractive if performance is top of your list

★★★☆☆

MSI Megabook M662

Price £760 **Contact** www.msicomputer.co.uk

MSI's M662 is the only notebook here with a dedicated numeric keypad on its keyboard, which at first makes you think it's bigger than the rest. However, MSI's trick is to squash some of the other keys together, which means undersized buttons on the right-hand side of the keyboard. It may not sound like a big deal, but when you're used to hitting keys in a certain place, typos can become more common. Whether it's worth getting used to will depend on how much you use the keypad.

Nevertheless, it seems MSI has attempted to veer away from the usual laptop design by incorporating touches such as a professional-looking glow-in-the-dark badge and a 1.3-megapixel camera on the lid. There's also a row of blue status LEDs on the front lip, highlighting things like the Wifi connection and battery charge status.

On the inside, the MSI uses Intel's T5600 Core 2 Duo processor, which runs at a clock speed of 1.83GHz. With an accompanying 1GB of DDR2 memory, the MSI achieved 210 in Sysmark and was almost bottom of the pack with 3,089 in PCmark05. Things aren't helped by the integrated Intel GMA 950 graphics chipset which had Far Cry trotting along at only 7.84fps. A score of 444 in 3Dmark05 wasn't much of an improvement either, making it clear that this notebook is not cut out for modern gaming.

However, this is MSI's entry-level Core 2 Duo notebook, so we weren't expecting bells and whistles – though it does have a 'Vista Capable' sticker.

The 100GB hard disk is what you should expect from a notebook costing this much, as is the multiformat DVD writer, and the 15.4in widescreen LCD has a maximum resolution of 1,280x800 and features an effective anti-glare screen coating. However, like most LCDs with this special coating, you have to be directly front on and dead centre for the best picture. Deviate slightly and contrast will dip and colours will look washed out – a double-edged sword if there ever was one.

We'd hoped for a DVI port for digital video connection to bigger displays but only S-video and VGA outputs are on offer. The big chassis does mean a healthy smattering of other ports though, with four USB, mini-Firewire, PC Card and memory expansion slots. MSI has kept things clean on the back of the case, opting to position everything around the side and front edges instead.

For a big laptop, the MSI is reasonably lightweight at 2.55kg excluding adapter, and definitely portable. However, running for only two hours in Mobilemark's productivity suite and one hour, 37 minutes in the DVD playback suite isn't particularly outstanding.

It also gets rather hot on the palm rest area underneath the keyboard, which some users may find uncomfortable.

Unfortunately the M662 doesn't come with any bundled software applications but the package does include an MSI-branded mouse and carry bag. How appealing these are is another matter, though, and given that it's an entry-level package many users might prefer a lower sticker price.

Notebook users with an eye on the future will appreciate the M662's compatibility with Vista and, for the price, it's not too bad. But compared to the majority of other notebooks here, it fails to compete on value for money, features or performance. A jack of most trades but master of none.

Verdict

Pros Affordable; Vista Capable; fast processor

Cons Battery life isn't great; poor graphics performance

Features ★★★☆☆

Performance ★★★☆☆

Value for money ★★★☆☆

Overall Compared to its peers, it's a middle-of-the-road notebook that's fine for general use but doesn't excel in any particular area

★★★☆☆

Rock Pegasus 665-T56

Price £899 **Contact** www.rockdirect.com

The Pegasus 665-T56 is billed as Rock's 'gaming to go' Core 2 Duo notebook, which sounds like a bargain at £849. But in fact, as far as 3D prowess goes, there are far better performers here. Nonetheless, the 665-T56 is quite capable of playing the latest games without jerkiness, if you're prepared to compromise on detail settings and resolution. Scores of 2,818 in 3Dmark05 and a frame rate of 55.66fps in Far Cry put it in third place behind the Asus, which uses the same 256MB Nvidia Geforce Go 7600 graphics chip, and the Evesham which employs ATI's Mobility Radeon X1600.

Rock uses the T5600 version of the Core 2 Duo processor, which runs at 1.83GHz and has a 2MB L2 cache. Combine this with a couple of 512MB sticks of DDR2-667 memory and, on paper, you've got a strong competitor in this round-up.

However, while the 665-T56 excelled in PCmark05, scoring 4,277, the Sysmark result of 204 wasn't as good as it could have been. That said, along with all the other laptops here, the Pegasus will run all of today's software at a fast pace. The difference will come when undertaking hard-core processing duties such as video encoding or image rendering.

Along with the Sony, the Rock sports the biggest hard disk here. Even by today's standards, 120GB is a decent size and, considering this notebook costs less than £900, it represents excellent value for money.

Along with the Asus, the Rock's 15.4in widescreen TFT display is one of the best here. Not only will it display a maximum resolution of 1,280x800 but the image is pin-sharp. Unlike other screens here with anti-glare coating, Rock's X-Glass system seems to be a cut above the rest, projecting a balanced image quality from a variety of viewing angles.

At 3kg excluding adapter it's not the lightest notebook in the group, but with its granite grey colouring and smooth lines, it's definitely one of the better looking. The positioning of the ports and sockets seem considered, with nothing looking out of place. Among the connectivity highlights is a DVI port, a digital audio output and an Express Card slot, though there are only three USB sockets. 802.11g wireless networking is fitted as standard and there's a Gigabit Ethernet port too.

Like the Evesham, the Rock continues the trend of having powerful graphics and processing power but absolutely dire battery life. Our Mobilemark test squeezed just one hour, 47 minutes out of the 665-T56 in the Productivity suite and a mere one hour, 35 minutes when watching a DVD.

Rock has incorporated a 'silent mode' feature into its notebook, though. Pressing a button above the keyboard reduces fan noise for those pensive moments.

Windows XP Home is its operating system and Rock includes copies of Roxio Creator 7, Microsoft Works 8 and a 60-day trial of Microsoft Office 2003. There's also one month of free Wifi access with The Cloud and a superb three-year collect-and-return warranty. Rock also states that if you have a change of heart up to seven days after purchase, it will give you a refund.

As usual, Rock has built a notebook that offers good value for money and has taken care with its design. With all things considered, the battery life is a sour point on what is otherwise a very good notebook.

Verdict

Pros Good graphics; good processor; great screen; big hard disk
Cons Awful battery life

Features	★★★★☆
Performance	★★★★☆
Value for money	★★★★☆

Overall Like most Rock notebooks we see, time and effort has gone into its construction and design and the Pegasus 665-T56 is good value

★★★★☆

Sony VGN-C1Z/B

Price £1,099 **Contact** http://vaio.sony-europe.com

In a world where laptops are made in their millions and are often simply rebadged versions of the same anonymous chassis, owning an original and eye-catching model is a rarity, unless of course you pay a premium and splash out on a Sony Vaio.

The VGN-C1Z/B has all the usual Vaio trademarks – well-rounded edges, X-Black screen and a lick of colour under the lid – but doesn't hit the same performance heights as others here.

Under the bonnet is Intel's T5500 processor, clocking in at 1.66GHz, and 1GB of DDR2-533 Ram, which can be expanded up to 2GB. Scores of 208 in Sysmark and 3,607 in PCmark05 may rank it below the Evesham, MSI and Asus in terms of raw power, but higher than the Rock, which boasts a faster T5600 processor.

Like several of the notebooks here, the Sony is the proud owner of a 'Vista Capable' sticker, which will please anyone looking to upgrade the operating system in the next year or so.

The 120GB Sata hard disk is one of the biggest here, which is especially good considering the notebook's physical size. The integrated multiformat DVD writer records to most disc formats and there's a memory card reader for Sony's Memory Stick.

Disappointing scores of 1,821 in 3Dmark05 and a 41fps frame rate in Far Cry don't do the Sony any favours. We realise this laptop isn't a dedicated gaming machine but we expected more from the 256MB Nvidia Geforce Go 7400, which uses Nvidia's Turbocache technology to improve performance.

Even if a high graphics score were achieved, things wouldn't look too impressive on the 13.3in display anyway, which is the Sony's biggest drawback when pitched against the other entrants here. The X-Black screen keeps things looking crisp and viewable in most lighting conditions but the compact size might deter some buyers.

With such a small screen, we didn't expect the VGN-C1Z/B to be quite so bulky. Measuring 4cm high means it won't just slip into a bag and the 2.75kg weight is heavier than anticipated.

However, the Sony's attractiveness improves with its decent battery life. Running for more than three hours in our Productivity suite and more than two when watching a DVD puts the majority of other laptops here to shame.

With such a chubby chassis to work with, you'd think that Sony could fit in an impressive collection of ports and sockets. However, just two USB ports are present and there's no DVI output either. There are VGA and S-video outputs, Express Card, iLink and 802.11g wireless networking.

Using the VGN-C1Z/B is comfortable, although the retro-keyboard styling is one of those love it or hate it things. It doesn't get too hot either, which will please lap-working business folk.

The Sony may not be the most powerful notebook here but it comes with an impressive software bundle. Along with photo and video-editing packages, courtesy of Adobe Photoshop Elements 4 and DV Gate Plus 2.2, there's Roxio Digital Media SE 7, Microsoft Works 8.5 and a copy of Norton Internet Security 2006 with 90 days worth of updates.

This laptop scores lower on value for money than others here and the screen is significantly smaller too. However, for those who just can't do without a Vaio logo, the VGN-C1Z/B should be a consideration.

Verdict

Pros Good battery life; great design; big hard disk

Cons Comparatively expensive; small screen

Features	★★★★☆
Performance	★★★★☆
Value for money	★★★☆☆

Overall As usual, the Sony entrant looks great but is overpriced compared to what others are offering and doesn't shine in the performance stakes

★★★★☆

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Lab results

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Sysmark 2004 SE (overall)

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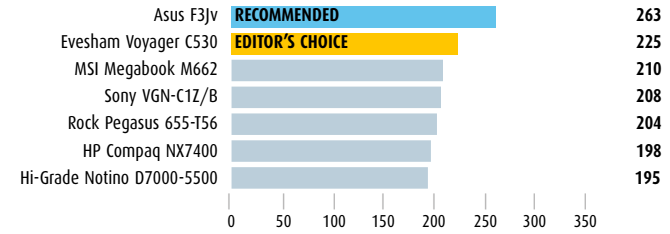
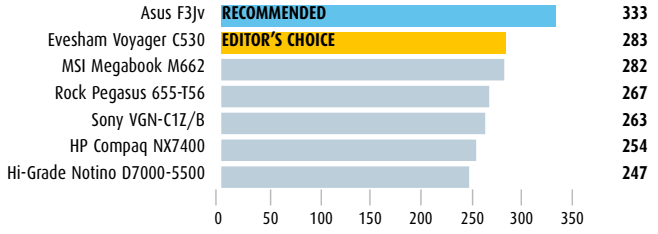


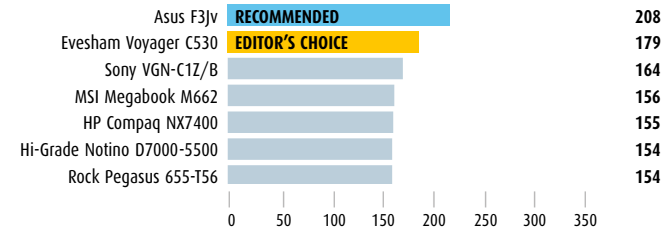
Sysmark 2004 SE (internet content creation)

Bigger is better



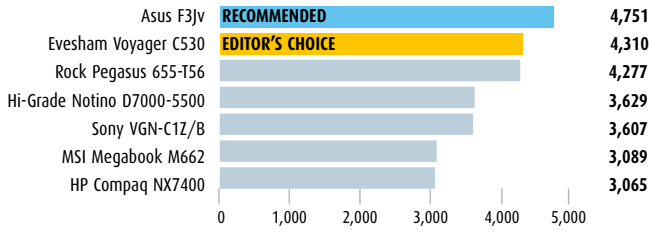
Sysmark 2004 SE (office productivity)

Bigger is better



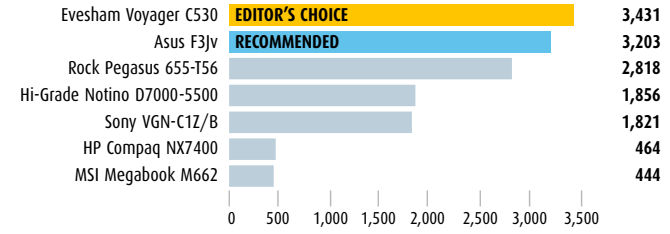
PCmark05 (overall)

Bigger is better



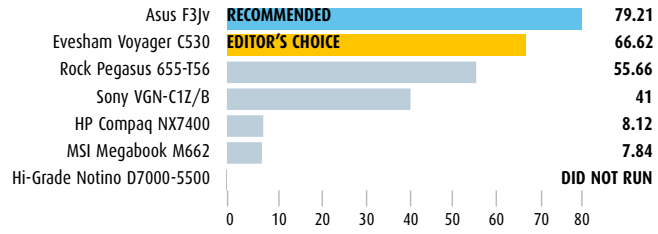
3Dmark05 (1,024x768 in 32-bit colour)

Bigger is better



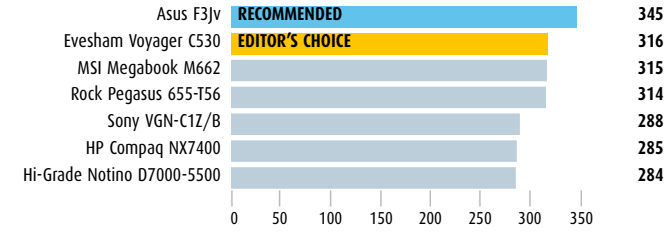
Far Cry (1,024x768 in 32-bit colour)

Bigger is better



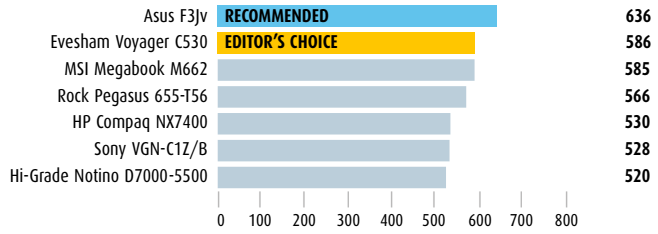
Cinebench (1 CPU)

Bigger is better



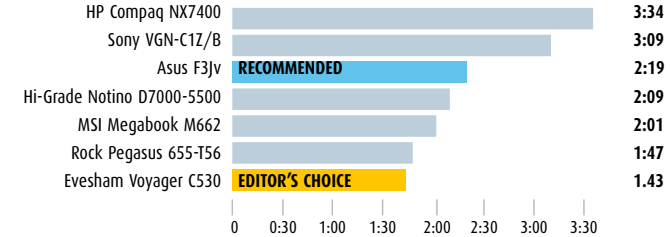
Cinebench (Multiple CPUs)

Bigger is better



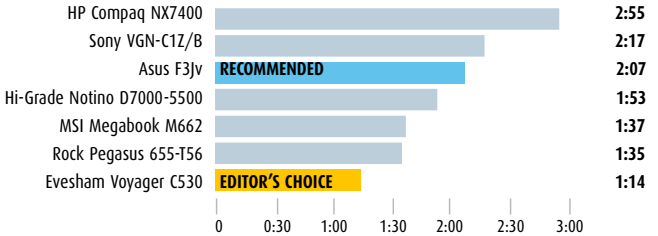
Mobilemark05 productivity (hours:minutes)

Bigger is better



Mobilemark05 DVD playback (hours:minutes)

Bigger is better



Please see page 106 for an explanation of how we tested the PCs

Budget Core 2 Duo laptops

MANUFACTURER	**ASUS**	**EVESHAM**	**HI-GRADE**
Model name	F3Jv	Voyager C530	Notino D7000-5500
Price inc Vat	£1,199	£849	£733.13
Sales telephone	0870 120 8340	0870 160 9500	020 8532 6100
URL	http://uk.asus.com	www.evesham.com	www.higrade.com
HARDWARE			
Processor	Intel Core 2 Duo T7200 (2GHz)	Intel Core 2 Duo T5600 (1.83GHz)	Intel Core 2 Duo T5500 (1.6GHz)
Chipset	Intel 945PM/ICH7-M	Intel 945PM/ICH7-M	Intel 945PM/ICH7-M
Available memory/type	2GB PC2-667 DDR2	1GB PC2-667 DDR2	512MB PC2-533 DDR2
Occupied/spare memory slots	2/0	2/0	1/1
Hard disk manufacturer and model	Hitachi HTS721010G9SA00	Fujitsu MHV2100BH	Fujitsu MHV2080BH
Hard disk size	100GB	100GB	80GB
No of Express card slots	1	1	1
No of PC Card slots	0	0	1
No of Firewire/serial/parallel/PS/2 ports	1/0/0/0	1/0/0/0	1/0/0/0
No of USB ports	4	4	4
MULTIMEDIA			
Optical drive	LG GMA-4082N	Sony DW-Q520A	Sony DW-Q520A
Optical drive formats and speed (max)	8x DVD, 8x -/+R, 4x -/+RW, 2.4x +R DVD DL, 3x DVD-Ram	8x DVD, 8x -/+R, 8x +RW, 6x -RW, 4x +R DVD DL, 6x -R DVD DL	8x DVD, 8x -/+R, 8x +RW, 6x-RW, 4x +R DVD DL, 6x -R DVD DL
Soundchip	Realtek HD	Realtek HD	Conexant HD
Graphics type/memory	Nvidia Geforce Go 7600/256MB	ATI Mobility Radeon X1600/256MB	Nvidia Geforce Go 7400/128MB
Screen size/maximum resolution	15.4in WXGA+ Colourshine/1,680x1,050	15.4in WXGA/1,280x800	15.4in WXGA/1,280x800
OTHER INFORMATION			
Misc hardware/modem	10/100 Lan, v.92 modem, 1.3-megapixel camera, 7-in-1 card reader	10/100 Lan, V.92 modem	Gigabit Lan, V.90 modem, 4-in-1 card reader
Wireless technology	802.11a/b/g, Bluetooth	802.11a/b/g	802.11a/b/g
Weight including AC adapter (kg)	3.55	3.35	3.4
Dimensions (wxdxh) mm	365x270x28	359x255x34	355x254.5x25.5
Operating system	Microsoft XP Pro SP2	Microsoft XP Media Center 2005	Microsoft XP Home SP2
Bundled software	Asus DVD XP 6.0, Power Director v3.0 DE, Mediashow v2.0SE, Norton Internet Security 2005, Acrobat Reader 7, Nero Express v6.0	Microsoft Works 8, Roxio Easy Media Creator, Bullguard Internet Security	Open Office, Sonic Recordnow, Sonic Cineplayer, Bullguard Anti-virus (3-month trial)
Standard warranty (RTB = return to base, C&R = collect and return)	2yrs RTB	1yr on site, 2yrs RTB	1yr C&R
SCORES			
Features	★★★★☆	★★★★★	★★★☆☆
Performance	★★★★★	★★★★☆	★★★☆☆
Value for money	★★★☆☆	★★★★☆	★★★★☆
OVERALL	★★★★☆	★★★★★	★★★☆☆

	HP COMPAQ	**MSI**	**ROCK**	**SONY**
	NX7400 (part no RH393ET)	Megabook M662	Pegasus 655-T56	VGN-C1Z/B
	£668.57	£760	£899	£1,099
	0870 010 4320	No UK number	08709 909 090	08705 111 999
	www.hp.com/uk	http://msicomputer.co.uk	www.rockdirect.com	http://vaio.sony-europe.com
	Intel Core 2 Duo T5500 (1.66GHz)	Intel Core 2 Duo T5600 (1.83GHz)	Intel Core 2 Duo T5600 (1.83GHz)	Intel Core 2 Duo T5500 (1.66GHz)
	Intel 945PM/ICH7-M	Intel 945PM/ICH7-M	Intel 945PM/ICH7-M	Intel 945PM/ICH7-M
	512MB PC2-667 DDR2	1GB PC2-667 DDR2	1GB PC2-667 DDR2	1GB PC2-533 DDR2
	0/1	2/1	2/0	2/0
	Seagate ST96812AS	Fujitsu MHV2100BH	Fujitsu MHV2120BH	Toshiba MK1234GSX
	60GB	100GB	120GB	120GB
	0	1	1	1
	1	1	0	0
	1/0/0/0	1/0/0/0	1/0/0/0	1/0/0/0
	3	4	3	2
	Toshiba TS-L462C	Philips SDVD-8821	Sony DW-Q520A	Pioneer DVR-K16M
	8x DVD, 24x CD-R, 4x CD-RW	8x DVD, 8x -/+R, 8x +RW, 6x-RW, 4x +R DVD DL, 6x -R DVD DL	8x DVD, 8x -/+R, 8x +RW, 6x-RW, 4x +R DVD DL, 6x -R DVD DL	8x DVD, 8x -/+R, 8x +RW, 6x-RW, 4x -/+R DVD DL, 5x DVD-Ram
	Soundmax HD	Realtek HD	Realtek HD	Realtek HD
	Integrated Intel GMA950/up to 128MB shared system memory	Integrated Intel GMA950/up to 224MB shared system memory	Nvidia Geforce Go 7600/256MB	Nvidia Geforce Go 7400/256MB
	15.4in WXGA/1,280x800	15.4in WXGA/1,280x800	15.4in WSXGA+/1,280x800	13.3in WXGA X-Black/1,280x800
	10/100 Lan, V.92 modem	Gigabit Lan, V.92 modem	Gigabit Lan, V.92 modem	10/100 Lan, V.92 modem, Memory Stick slot
	802.11a/b/g	802.11a/b/g	802.11a/b/g	802.11a/b/g, Bluetooth
	3.05	3.25	3.65	2.85
	300x357x26	358x259x27	360x269x37.1	329x236x37.2
	Microsoft XP Pro SP2	Microsoft XP Home SP2	Microsoft XP Home SP2	Microsoft XP Media Center 2005
	HP Protect Tools, HP Drivelock	None	Microsoft Works 8, Office 2003 (60-day trial), Roxio Creator 7, Napster (1-month subscription)	Microsoft Works 8.5, Office 2003 STT (try and buy), Norton Internet Security (90 days free virus update, Norton Ghost 10 (try and buy), SonicstageCP 4.0, DVgate Plus 2.2, WinDVD 5.0, Adobe Photoshop Elements 4.0, Roxio Digital Media SE7
	1yr C&R	2yr RTB	3yr C&R	1yr C&R
	★★☆☆☆	★★★☆☆	★★★★☆	★★★★☆
	★★★☆☆	★★★☆☆	★★★★☆	★★★★☆
	★★★★☆	★★★☆☆	★★★★☆	★★★☆☆
	★★★☆☆	★★★☆☆	★★★★☆	★★★★☆

Vendors of group test products are only obliged to sell them at the prices quoted here (which include delivery and credit card surcharges) for the life of this PCW issue. They may also change components under certain circumstances. ↘

How to look after your laptop's battery

Exploding laptop batteries might make good headlines and video clips, but the recent spate of battery recalls involving defective Sony lithium-ion (Li-Ion) batteries fitted in several top-name notebook makers (see news coverage at **www.pcw.co.uk**) will not make the average notebook owner very happy. The thought of a laptop spontaneously going up in flames while unattended in an office, car or home is enough to give those of a nervous disposition sleepless nights. But assuming you're not one of those affected by the recall, is there any reason to worry, or are there any precautions you should take?

Pictures of an exploding Sony battery in a Dell laptop prompted a massive worldwide battery recall

A bundle of portable power

Rechargeable Li-Ion battery cells have been around since about 1991 and made truly portable computing a reality. Li-Ion chemistry is widely regarded as one of the safest battery technologies for consumer devices.

They have good performance, are cheap and lightweight. They don't suffer from 'memory' effects and don't need charging maintenance cycles. But on the downside they need complex charging and protection circuits to prevent them becoming unsafe. And, if the picture above doesn't jog your memory, always remember that batteries are powerful capsules of electrochemical energy, and you should treat them with serious respect.

Battery packs are robust, but are certainly not immune to bad care and handling. For example, dropping a battery pack can damage the casing or internals, or in severe cases cause it to catch fire. A battery that's suffered a hard fall shouldn't be trusted, but replaced. Also, don't let a battery become too hot, for example by leaving your laptop on the passenger shelf of a car. Overheating can degrade the battery's performance and lifespan, or in extreme cases cause it to fail violently. When using your laptop on the move, keep all the vent holes clear to prevent build-up of internal heat.

But there are some myths still associated with Li-Ion batteries. One is that constantly 'topping' up the battery can damage it – this isn't true. The reason, according to Motorola's website (see link below) is that relationship between depth of discharge and number of charging cycles is logarithmic, not linear. In simple terms this means that a battery rated for 300 full discharge cycles will actually be able to last several thousand shallow discharge cycles: if this wasn't the case, simply plugging in your laptop 300 times would be enough to ruin your battery. However, if you mostly use your laptop on mains power, there's no harm in removing the battery and storing it safely. According to battery specialists Cadex Electronics, Li-Ion batteries should ideally be stored at below 15°C and at about 40-50 per cent charge level.

Kelvyn Taylor

Links to battery technical information

www.buchmann.ca Cadex Electronics
www.powerstream.com/tech.html Lots of technical info on different battery types
www.motorola.com/testservices/article1.htm Motorola's power testing labs

Editor's Choice

Editor's Choice Evesham Voyager C530
Recommended Asus F3Jv

Evesham Voyager C530

Asus F3Jv

This test of entry-level Core 2 Duo notebooks highlighted some interesting issues. Should you save cash and buy a cheaper model or it is worth paying hundreds of pounds more for a laptop that will complete tasks a few seconds quicker?

One thing's for sure – the latest dual-core architecture has put the clock speed myth to rest. Two years ago, a notebook running at 1.6GHz would struggle to keep up with the latest software, so to see these processors fly through strenuous tasks is impressive. However, if you were hoping lower clock speeds would also help to improve battery life, judging by what we've found here, you may be disappointed.

So, which of the systems on test caught our eye? The Sony offers the usual flair and style we've come to expect from its Vaio range but compared to the Evesham and even the £760 MSI, the style over substance issue is a difficult pill to swallow. At the bottom end of the scale, the Hi-grade offers good value for money. Compared to the similarly priced HP, which lacks a DVD-writer and scored very low in PCmark05, the Notino D7000-5500 stands out. However, the NX7400 displayed incredible resilience in our battery benchmark, running for three hours, 31 minutes, which wipes the floor with anything else here.

The Asus F3Jv was by far the fastest notebook with the best components. Compared to the Sony, which is only £100 cheaper, it is good value for money. But put it against the Evesham and you wonder whether that extra £350 is worth the difference in performance. We don't think it's the best overall, but it's the best choice if you're prepared to spend a bit more for a fast, well-designed and well-specified laptop and so it gets a Recommended award.

Our Editor's Choice is awarded to the Evesham Voyager C530. For not much more than the cheapest notebook here it performs consistently across the board. Its battery life may not be the best, but along with a good processor, fast memory and decent hard disk, you also get XP Media Center Edition, a TV tuner and a good warranty package. **PCW**

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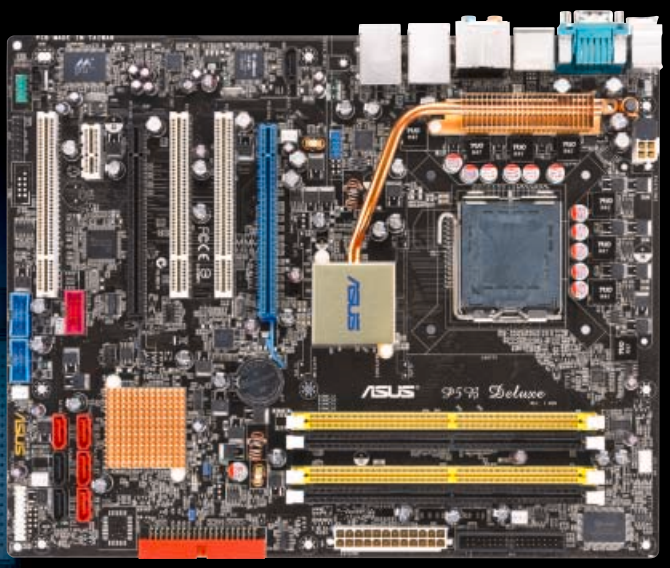

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ON TEST

130 **Canon Pixma IP6700D**
131 **HP Photosmart D7360**
132 **Epson Stylus Photo R360**

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How we tested the photo inkjet printers
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135 Photo printing under Windows Vista
Editor's Choice

'They all operate just as well away from your PC and connected, so usability, image browsing and editing features are all important'

Printer perfection

High-quality A4 photo printers are becoming rare beasts due to the current fad for all-in-one printers. But they still have a lot to offer, as Paul Monckton discovers

Since we last looked at A4 photo printers, all-in-one devices have all but taken over. With Lexmark having left the high-end A4 photo printer market altogether, we're left with only a handful of printers to test.

The latest top-of-the-range models from Canon, Epson and HP are much better than previous generations and deliver excellent results for the hobbyist or business user. With new dye-based inks and improved paper technologies, we're seeing many of the problems we've come to expect all but eradicated.

Water droplets or scratches used to spell the end for many prints, but today all three manufacturers are producing photos that are better looking and more durable than ever.

Attempting to choose one of these photo printers on quality alone is now almost a pointless exercise as they're so well matched. Instead we have to look at what other features are on offer. With all three models designed to operate just as well away from your PC as when connected to it, usability, image browsing and editing features are all very important.

The three models reviewed here all have large LCD panels of about 3.5in in diagonal and can crop, edit, enhance and print photos without the need to go anywhere near PC-based image-editing software.

All use six ink colours and flash memory card slots. It's also possible to connect Pictbridge-compatible cameras directly as well as Bluetooth adapters to allow printing from mobile phones.

Considering that these superb printers start from £149, if you're a serious photographer who values quality over superfluous functions, now's the time to grab one before they become an extinct species.

↘

Canon Pixma IP6700D

Price £149 **Contact** www.canon.co.uk

The front panel is less intuitive than others on test

Top of Canon's new range of six photo printers, the Pixma IP6700D replaces last year's highly successful IP6600D. Like the other printers reviewed here, it uses six individual ink tanks, filled with a dye-based ink.

A good selection of controls enables you work from the printer, rather than a PC. This goes beyond simply printing photos: a touch of a button will transfer stored pictures to your PC. No confirmation is required at the PC end, so the process is entirely automatic. However, if you press the button by mistake you'll have to go to the PC and cancel the transfer from there.

Using the printer's front panel isn't quite as speedy as on the Epson or HP printers – it takes a little longer to read the memory card and browse through the images. It's also a little less intuitive. For example, the display says "Stop > Cancel" to interrupt an operation, but there are no buttons marked either 'Stop' or 'Cancel'. There is actually a dedicated cancel button that will put a stop to the unwanted print job, but we would have found it quicker had the display not been slightly misleading. HP's D7360 certainly has the edge in usability here.

When printing from Adobe Photoshop, we found A4 borderless printing to be a little problematic, often leaving us with small unwanted borders. Although this issue may be specific to Photoshop, we didn't encounter similar problems with the other printers.

The flexible media handling of the IP6700D puts it ahead of the competition. Not only does it support direct DVD/CD printing such as the Epson Stylus Photo R630, it also includes automatic double-sided (duplex) printing as standard – even in photo mode if you use Canon's new double-sided photo paper.

As with HP's Photosmart D7360, it has two paper trays, allowing two types of paper to be loaded simultaneously so you can swap between printing photos and documents with the minimum of fuss.

Unlike either of the other printers, the IP6700D uses a printhead that's separate from the ink cartridges and must be installed separately. This cuts down on the cost of the individual ink cartridges but means you have an extra component that might need to be replaced eventually.

Installing the ink cartridges is easy, although access isn't quite as simple as either the Epson or the HP printers. You have to open the lid from the top and peer through a relatively narrow gap to see what you're doing. The process is made much easier by Canon's use of illuminated ink cartridges, so you can see immediately which cartridge needs replacing.

We found the relative performance of the IP6700D to be quite variable: in some tests it's the fastest, while in others it lags behind. Despite being technically the highest resolution printer of the three, with a maximum resolution of 9,600x2,400dpi and a droplet size of just one picolitre, it consistently outperforms the competition when printing photos at maximum quality.

What it lacks is a fast mid-quality photo mode as provided by Epson and HP. In some cases, setting it up for standard quality actually caused it to print more slowly.

With automatic settings selected, the IP6700D produced slightly sharper images than Epson's Stylus Photo R360 but at the expense of some punch in the colours. Overall, there's very little to separate any of the printers on print quality alone.

Verdict

Pros Auto double-sided printing as standard; separate printhead keeps ink prices down

Cons No high-speed photo mode; menu interface slightly confusing

Features ★★★★☆

Performance ★★★★☆

Value for money ★★★★☆

Overall A very competent printer; lacks the usability of the HP product, but great value for an auto-duplex device

★★★★☆

Epson Stylus Photo R360

Price £149.99 **Contact** www.epson.co.uk

This printer's 3.5in LCD is a useful size

Epson's latest photo printers, the Stylus Photo R265 and Stylus Photo R360 both take advantage of newly developed ink technology to achieve better print quality. Here, we're reviewing the top-end model, which includes a 3.5in LCD and a selection of image-editing facilities that work independently from your PC.

Claiming print times as fast as 13 seconds for a 6x4in photo, the Stylus Photo R360 appears at first glance to be tantalisingly close to HP's claimed 12-second rating and yet at a considerably lower price.

In our tests, the R360 performed pretty well when printing photos, but on default settings it was no match for the HP Photosmart D7360. When printing standard A4 documents, the gap grew wider still. When compared with the Canon Pixma IP6700D, it's certainly horses for courses, with the two swapping places regularly from test to test.

Epson claims to have achieved some of its gains in print speed through the use of its new five-level variable droplet size technology. The smallest droplet size of 1.5 picolitres is used for areas with fine detail, while larger droplets are used to fill in areas of solid colour more quickly and evenly. This enables gains in both quality and performance and could explain why some test results were faster than others.

When it comes to running costs, Epson was far from helpful. While the spec sheets will tell you that individual ink cartridges start from only £6.99, no yield information is published (and Epson would not give us such information) making it impossible to estimate how much prints will cost.

The printer itself, however, gives you some idea of how many pages there are left to print based on the last type of page printed. However, this doesn't kick in until you have less than 100 prints left.

Epson's Photo Enhance technology detects the content of photos and applies enhancements automatically. It can spot skin tones, landscapes and sky and will attempt to fix common problems, such as when a subject is silhouetted against bright back-lighting.

In our tests, the R360 did a very good job of bringing out bright colours from our source material without them appearing over-processed. Under very close scrutiny, prints seemed a little lower in contrast and sharpness but higher in colour when compared with either the Canon or HP printers.

It was also the only printer that gave us perfect borderless A4 prints every time, without the need for any tweaking in the drivers to eliminate small white margins.

Using the built-in image browsing functions was a little faster on the R360 than on Canon's IP6700. It found 73 photos on our memory card very quickly and let us whiz around the colourful menus with very little waiting. Also included on the R360 is the ability to print frames from video clips. We tried three, in Mov, Avi and Wmv format but unfortunately none of these seemed to be compatible with the printer.

Printing onto DVDs or CDs is also possible with the R360, although it doesn't have the option of double-sided printing or the covered paper trays of the HP Photosmart D7360.

The Stylus Photo R360 costs a lot less than the D7360, but there are also significant features missing. However it's capable of creating impressive photos and has a user interface that's friendlier and easier to use than Canon's.

Verdict

Pros Good user interface; able to print from movies; good auto-picture enhancement

Cons No quoted running costs; slow in some tests; no duplex option

Features ★★★☆☆

Performance ★★★★☆

Value for money ★★★★☆

Overall A good choice for those who want to use an LCD control panel. It's more cost effective than the HP Photosmart D7360, but with fewer features and lower performance

★★★☆☆

HP Photosmart D7360

Personal Computer World EDITOR'S CHOICE

Price £199.99 **Contact** www.hp.com/uk

Photo-editing features are accessed via a touch-screen LCD

Of the three printers reviewed here, HP's Photosmart D7360 is the most expensive, but delivers outstanding performance and some unique features.

Among these are dual covered paper trays, support for long, panoramic paper sizes and excellent built-in photo-editing facilities via a touch-screen LCD panel.

The A4 and 6x4in paper trays mean you can switch between printing regular A4-sized documents and album-sized photos without having to get up and reload paper. Both trays are covered, which helps protect the printer from dust. And, because they're at the front of the printer, you can access them easily without having to reach round to the back.

Unlike the Canon Pixma IP6700D and Epson Stylus Photo R360, the Photosmart D7360 doesn't support direct printing onto DVDs or CDs. Instead, HP has created its own 'CD/DVD Tattoo' media, which basically consists of sticky labels that can be applied to discs using a special applicator.

In addition to printing excellent photographs, the Photosmart D7360 performs very well as a general-purpose inkjet. Although we couldn't achieve the rated 32ppm when printing anything useful, it consistently outperformed its competitors when set to standard or fast modes. In fact, it was often over twice as fast. Also, its competitors' printouts were considerably worse in draft mode, often producing blacks that would be better described as browns. In its fastest mode, the D7360 still produces strong black text, albeit at a reduced resolution.

Photo printing at 6x4in was also very fast. Although a little slower when in the very highest quality mode, the D7360 wins by a significant margin at default settings. All the printers here were capable of producing excellent-quality prints. In our tests, the D7360 produced slightly more detail and contrast than either the Canon or Epson products. However, in auto mode, colour on the HP was a little dark, with the Epson R360 producing the most pleasing results.

The most noticeable advantage of the D7360 is found when using the printer away from the computer. All three printers come with large LCD panels, but the D7360 is the only one to offer touch-screen capability. This means far fewer control buttons are needed on the printer itself and the onscreen buttons can be much more descriptive. You see the function you want and press it – there's no need to read a menu to find out which button activates a function.

There's a lot you can do from here without the need for any photo-editing software. Auto-correction features, such as adaptive lighting and automatic red-eye removal, help improve poorly exposed photos and you can save the edited photos by initiating a PC transfer from the printer.

In addition to the memory card slots, you can use the front USB port to print directly from a Pictbridge-compatible camera or a USB flash drive. Alternatively you can plug in a Bluetooth adapter for wireless printing, perhaps directly from your camera phone.

Lifting the cover reveals six large ink cartridges, the black one larger still, which are very easy to install. The cartridges themselves don't move, so you don't have to wait for the printer to move the print carriage; they just clip in place at the front of the printer.

This is definitely the most impressive of the three printers, and we feel that for the serious user it's well worth the extra cost.

Verdict

Pros Very fast; dual covered paper trays; touch screen

Cons No direct DVD/CD printing; high price

Features ★★★★★

Performance ★★★★★

Value for money ★★★★★

Overall An excellent printer that feels worth the extra money even before you turn it on

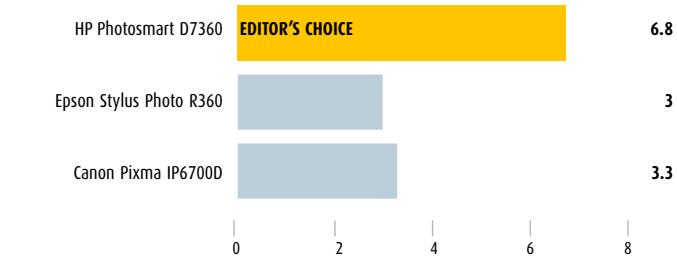
★★★★★

Lab results

The good news is that we found no significant quality differences between the printers. However, as you can see below, the speed of printing varies considerably

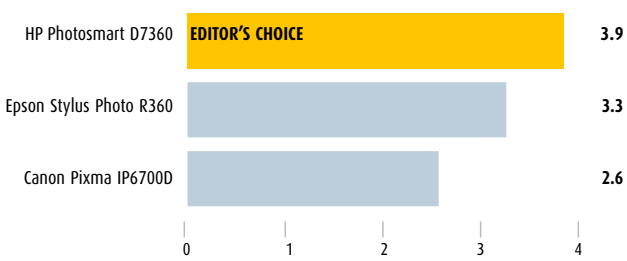
Text speed (pages per minute)

Bigger is better



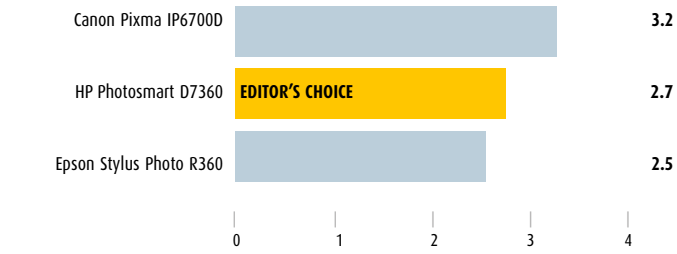
Colour speed (pages per minute)

Bigger is better



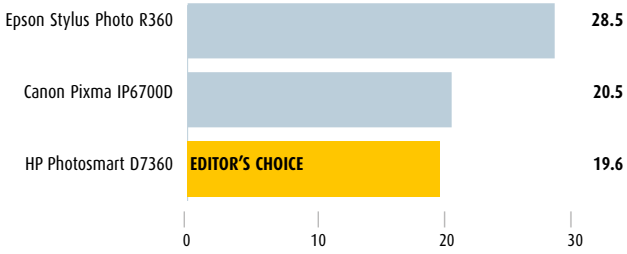
Mixed mono speed (pages per minute)

Bigger is better



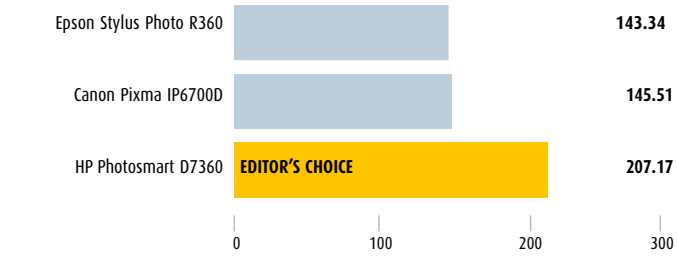
Raw engine speed (pages per minute)

Bigger is better



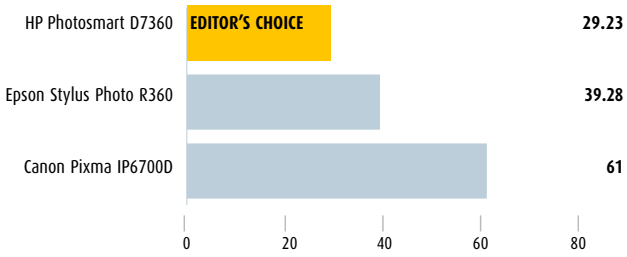
A4 test photo speed (seconds)

Smaller is better



6x4 test photo speed (seconds)

Smaller is better



How we tested the photo inkjet printers

To judge the various strengths and weaknesses of each printer, we put them through a series of different tests.

To assess print speed, we timed the printers' output performance when printing plain text, Pdfs, mixed content pages and photographs in both A4 and 6x4in sizes.

We also ran tests using virtually blank pages, to measure the absolute maximum performance possible from the print engines.

In each test, we selected the highest quality setting possible, the default setting and then the fastest mode available. All A4 tests, with the exception of the photograph, were printed on standard plain paper.

All photographic tests were carried out using the best quality branded photo paper supplied by each vendor. Again, we chose the highest quality print mode, followed by default settings and then a fast mode if available.

To evaluate print quality, we used samples from the above tests printed at various quality settings as well as images taken from Kodak's Color Management Check-Up Kit. This kit contains colour-managed images along with reference prints that can be compared with the printers' output to judge overall colour accuracy.

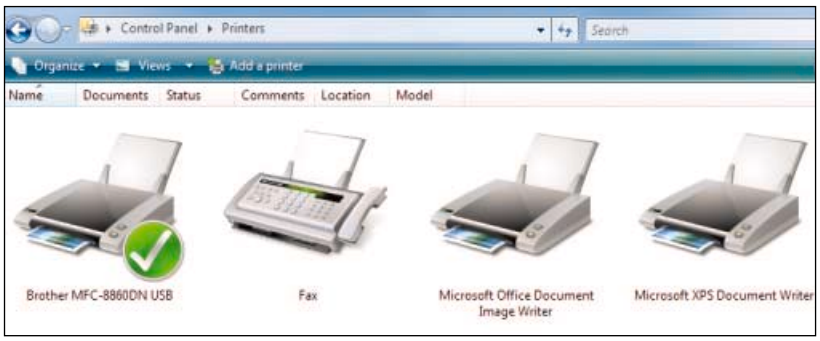
In terms of print quality, there's very little to distinguish these three printers. All of them produced excellent results, although none of them produced exact matches to our reference prints.

Differences in colour output are largely down to taste: All three printers will deliver a good-looking image from a mediocre photo and we found that in this respect they generally do a very good job.

A4 inkjet photo printers

MANUFACTURER	CANON	EPSON	HP
Model	Pixma IP6700D	Stylus Photo R360	Photosmart D7360
Price inc Vat	£149	£149.99	£199.99
URL	www.canon.co.uk	www.epson.co.uk	www.hp.com/uk
Approx ink cost per 6x4in photo	19p	Not specified	19p (using multipack inks)
Ports (standard)	USB2 Hi-Speed, Irda 1.2	USB2 Hi-Speed, IrDA 1.3	USB2 Hi-Speed
Ports (optional)	Bluetooth	Bluetooth	Bluetooth
Standards	Pictbridge	Exif Print, Pictbridge	Pictbridge
DVD/CD printing	✔	✔	✘
Maximum resolution (dpi)	9,600x2,400	5,760x1,440	4,800x1,200
Dimensions (printing wxdxh)/Weight (kg)	429x304x183/7.5	453x538x285/7.15	463x50x36/8
Warranty	1 year	1 year	1 year
PAPER HANDLING			
Number of paper trays/Covered paper tray	2/✘	1/✘	2/✔
Input capacity (A4 90gsm)	300	120	120
Borderless printing	✔	✔	✔
Auto duplex printing	✔	✘	Optional
Auto paper-type detection	✘	✘	✔
FRONT PANEL			
No of card slots/Formats supported	2/CF II/MS/SD/MMC/SM/XD	2/CF II/MS/SD/SDHC/MMC/XD	4/CF II/MS/SD/MMC/XD
LCD screen size (inches)/No of pixels	3.5/76,800	3.5/62,400	3.4/Not specified
Touch-sensitive screen	✘	✘	✔
INK			
No of colours/cartridges	6/6	6/6	6/6
Ink life/type	Not specified/dye	6 months from opening/dye	Not specified/dye
Splash resistant	✔	✔	✔
Minimum droplet size (pl)	1	1.5	Not specified
No of nozzles	3,072	90 per cartridge	Not specified
Cartridge costs	£9.99 per cartridge	£6.99 per cartridge	Large black £21, others £11. 6 cart multiplack plus 150 6x4 photo sheets is £28
A4 MIXED COLOUR PAGE YIELDS			
Black	291	Not specified (Epson declined to provide any ink yield information)	Large 1,120, std 410
Cyan	880	Not specified	410
Magenta	630	Not specified	370
Yellow	600	Not specified	500
Light Cyan	2,615	Not specified	9,900
Light Magenta	3,505	Not specified	9,200
6X4 PHOTO YIELDS			
Black	990	Not specified	Large 1,040, std 380
Cyan	780	Not specified	330
Magenta	610	Not specified	270
Yellow	298	Not specified	160
Light Cyan	211	Not specified	230
Light Magenta	148	Not specified	220
RATED SPEED			
Monochrome A4 (ppm)	18 fast/17 std	30	32 fast/7.8 std
Colour A4 (ppm)	17 fast/4.9 std	30	31 fast/5.7 std
Photo 6x4in	47 sec (std)	13 sec	49 sec (best) 12 sec (draft)
OPERATING SYSTEMS SUPPORTED			
Windows 98SE/ME/NT/2000/Server 2003	✔/✔/✘/✔/✘	✔/✔/✘/✔/✘	✔/✔/✘/✔/✘
Windows XP/XP 64-bit	✔/✔	✔/✔	✔/✔
Windows Vista 32-bit/Vista 64-bit	✘/✘	✘/✘	✘/✘
Mac OS9/OSX/Linux	✘/10.2.8 or later/✘	✘/10.2.8 or later/✘	✘/10.3 or later/✘
Supplied software	Memory Card Utility, Easy-Web Print, CD-Labelprint, Adobe RGB. Photo Record, Easy-Photoprint, Easy-Print to box	Easy Print Module, Print Image Framer, Print CD, Web-to-Page, Easy Photo Print, Creativity Suite, Camera Raw Plug-in	HP Photosmart Premier Software Suite
SCORES			
Features	★★★★☆	★★★☆☆	★★★★★
Performance	★★★★☆	★★★★☆	★★★★★
Value for money	★★★★☆	★★★★☆	★★★★★
OVERALL	★★★★☆	★★★☆☆	★★★★★

Photo printing under Windows Vista



Windows Vista comes with an integrated XPS printer for creating XPS documents from any app

Most existing printer drivers and installation routines don't work with current pre-release versions of Windows Vista. However, many older printers include drivers that are in the latest Vista builds we've seen. This means you should be able to get your current printer to work, but there's no guarantee that the rest of your software will be compatible or that the built-in drivers will support all your printer's functions.

Drivers for the printers reviewed here aren't yet on the Vista install discs. So if you're already running the Vista beta be prepared to switch back to XP if you want to use one of these newest models.

Having invested in an advanced photo printer with a built-in LCD control panel and PC-less printing capability, no level of operating system incompatibility will stop you from printing photos. But if you're upgrading the operating system you would expect to improve, or at least maintain, your printing capabilities. So let's look a little closer at what Vista promises.

The XML paper specification

Vista's printing system, XML Paper Specification (XPS), will require new drivers. Old-style XP drivers will not be adequate. Luckily, Canon, Epson and HP are backing the XPS standard so we should expect to see XPS drivers available for most photo printers around the time of Vista's release.

In many ways, XPS is similar to Adobe's Pdf format. Included in Vista is a virtual printer, called the 'Microsoft XPS Document Writer' whose function is to produce XPS documents printed directly from applications, in much the same way as the Adobe Pdf Writer produces Pdfs.

Where previous versions of Windows have used intermediate files called metafiles to represent output to printers, XPS documents enable users to view and print the files more easily without the need to have a copy of the application that created them.

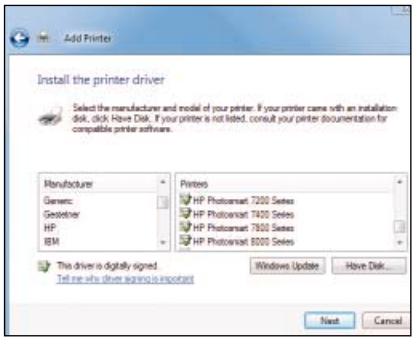
The XPS Viewer included with Vista displays XPS files on screen just as Adobe reader presents Pdfs. But unlike Pdfs, XPS files don't contain dynamic or interactive features such as support for forms.

The XPS-based driver model is a replacement for the existing GDI-printing system used by most Windows inkjet printers that don't use the PCL or Postscript standards. XPS will deliver better support for colour matching and enable printing devices to express their capabilities more precisely via the driver interface. This will allow better use of the printer hardware by applications. One example is the Windows Color System (WCS) incorporated into Vista, which will be able to make full use of the range of colours modern inkjets can produce.

Other benefits to the user will be much smaller print jobs in the spooler – and therefore faster print times, and better quality output, especially when printing gradients and transparent layers.

Unfortunately, there's no specific XPS logo programme for printers, but all products sold as 'Certified for Windows Vista' will require signed XPS drivers.

At the moment, none of the three vendors in this round-up are making any promises regarding Vista driver support, but given their level of involvement with XPS, the outlook is good.



None of the printers reviewed here have drivers supplied with Windows Vista yet

Editor's Choice

Editor's Choice HP Photosmart D7360

All three products here are capable of producing excellent-quality prints. One product stands out in two very obvious ways. At £199, HP's Photosmart D7360 costs £50 more than Canon's Pixma IP6700D and Epson's Stylus Photo R360. It's also far and away the fastest of the three and offers the best usability.

In our opinion it is most certainly the best printer of the three, but is it worth the extra cost? And if not, which of its two similarly performing rivals should receive the award when they're so closely matched, albeit with slightly different feature sets.

The Pixma IP6700D has built-in duplex printing and dual paper trays, but the Stylus Photo R360 has a faster, friendlier control panel and speedier photo printing options.

After some deliberation, we've decided to give our Editor's Choice award to the HP Photosmart D7360. Yes it does cost more, but for the extra money you get extremely high performance whether printing photographs or office documents. It may cost 25 per cent more, but printing speeds are often double that of its rivals – it really punches those pages out incredibly fast.

It also has an innovative touch-screen control panel, which means you're never at a loss for which button to press. The onscreen help is excellent as is the PC software package, which provides a tremendous amount of help and support. Ink cartridges are also very easy to install. In fact, usability is excellent throughout, giving an unrivalled user experience. And with the market for single-function inkjet printers declining, you'll probably be able to find some attractive discounts as we approach the post-Xmas sales.

Of the remaining two, it would be unfair to single out just one product for an award. If you can't afford our Editor's Choice, then either of these printers represent a solid investment. **PCW**

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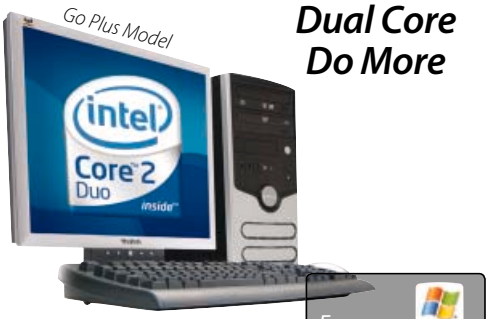

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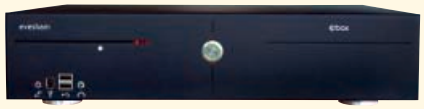

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- Wireless Mini PCIe 802.11abg (54Mbps) LAN
- Internal digital TV tuner
- Built-in media card reader (MS/Pro, SD, MMC)
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COMPILED BY ALAN STEVENS

BUSINESS

UPWARDLY MOBILE

Remote and mobile working are very much top of the small-business agenda at present. So we're kicking off this month's business section with a look at how you can extend your network to give teleworkers and road warriors the same kind of access as their local counterparts.

There's a mobile theme to the reviews too, starting with a business handheld from HP that combines a mobile phone with a PDA, throwing in wireless networking and GPS navigation for good measure. Plus we take a first look at an SSL VPN appliance from Sonicwall aimed at small companies looking for secure remote Lan access on a budget.

We also investigate adding instant messaging and web conferencing to your network with IBM's Lotus Sametime 7.5. And there's an exclusive review of a network scanner from Kodak, the latest Google Mini 2 and a lot more besides.

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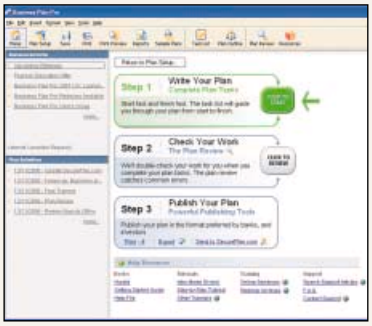


OUR SCORING

Excellent ★★★★★ **Very good** ★★★★☆ **Good** ★★★☆☆ **Below average** ★★☆☆☆ **Poor** ★☆☆☆☆

OUR AWARDS

Editor's Choice: The best product in a comparative group test. Anything that wins this award is of better quality than its competitors.
Recommended: A product that combines great features, usability and value for money.
Great Value: Not the best in class, but a product that has superior features and performance for the price.

Editor's Choice Business

Recommended Business

Great Value Business

The business awards are used for products that are more suited to home offices or small businesses.

'Search results are returned within seconds with the usual options to order the results by relevance or index date'

Read the review on page 144

Remote possibilities

Want to extend your network, but not sure how to go about it? Remote VPN access could be the answer, so we show you how a small business can use it

Ask most business users if remote access would be useful and they usually say yes. Dig a bit deeper, however, and you'll find that most really only need to get to their email, which is quite easy to do.

One way is to go for a hosted email solution (see box on next page), but web-based email is also a good alternative. In fact, most email servers now include a web-based client as standard, such as Outlook Web Access (OWA) in Exchange Server, for example, or Worldclient in the popular MDaemon solution. These can be used instead of a standard Windows client, such as Outlook, to give users remote access to their mailboxes through a browser.

You will have to make changes to the firewall, but it's not difficult. All that's really needed is a rule to direct incoming traffic to the local mail server. Users then connect to the internet, open a browser and point it at the server name or address you give them.

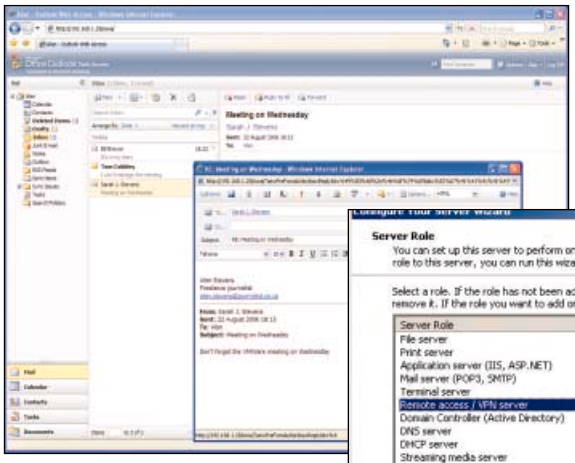
What users can see and do will depend on the software. In all cases messages can be sent and incoming mail opened and replied to, but often there are a lot more options. With Outlook Web Access, for example, users will see an almost identical interface to the standard Outlook, with similar functions, and can even take advantage of shared address books and calendars. Web-based email, then, is often all that's required, enabling mobile workers to keep in touch while out and about. However, if they also need to run other applications, connect to network shares and print using network printers, a more extensive Virtual Private Network (VPN) solution will be required.

Where large numbers of users are involved, a specialist VPN appliance may be the best solution

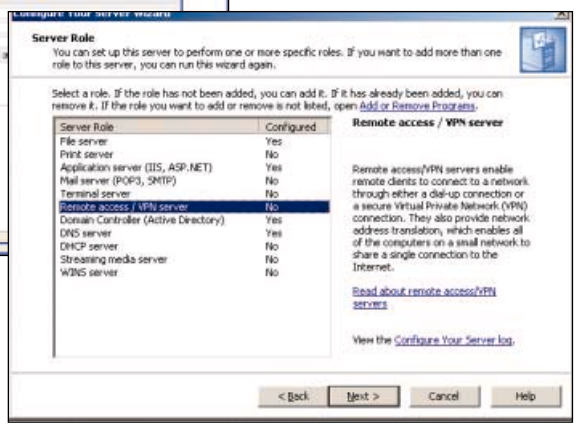
The VPN approach

VPN technology isn't rocket science: it's just a way to connect networks and users over the internet with a clutch of technologies to keep the communication private. The first of these is encryption, where everything transmitted is scrambled; so should the VPN data be intercepted, it won't make sense. It's then wrapped (encapsulated) inside ordinary TCP/IP packets and directed across the internet to create what's referred to as a VPN 'tunnel', using special tunnelling protocols. Several protocols can be used here, the simplest but least secure being PPTP (Point-to-Point Tunnelling Protocol) with IPSec (IP Security) at the other end of the spectrum in terms of both security and complexity.

Fortunately you don't have to know too much about this to set up or manage a VPN. You just need to be aware that they can be used in two ways, the easiest being site-to-site.



Above: Most users only need remote access to their email, and that's easily provided via a web-based client such as Outlook Web Access



Below: The VPN gateway in Windows Server 2003 is one way of providing remote access on a small business network

The site-to-site VPN

A site-to-site VPN is used to link branch offices and teleworkers to a central office network, which is easy because you only need one tunnel between the two locations. Also, it can be left permanently configured and no client software is required. The VPN tunnel simply becomes a part of the network with remote users logging on and accessing resources in the same way as those attached locally to the network.

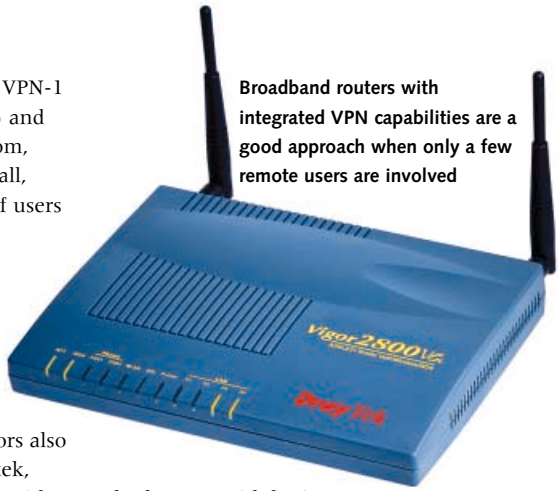
To create site-to-site VPN tunnels you need a gateway at each location, implemented either in software or a hardware appliance. Specialist VPN software to do this is available from companies such as Check Point, Microsoft and Smoothwall. However, these packages can be expensive as they often include firewall and other security features that you may not need. Examples of this type of solution are Microsoft's Internet Security and Acceleration (ISA) Server 2005 and the Astaro Security Gateway (see **www.pcw.co.uk/2166551**). A VPN gateway, suitable for most small businesses, is also included as part of Windows Server.

If you don't have servers at each location, or don't want the overhead of managing them, there are plenty of hardware

alternatives, such as the Check Point VPN-1 UTM Edge (see **www.pcw.co.uk/2163709**) and others from companies including 3Com, D-Link, Linksys, Netgear and Sonicwall, which are suitable if large numbers of users need to be supported.

You can also look for broadband routers with VPN gateways built in; these are likely to be cheaper, and you don't have to worry so much about having to change your firewall to allow the VPN traffic through. The same networking vendors also sell VPN-enabled routers, as do Draytek, whose Vigor routers are very popular with small-business users, and Zyxel.

Whatever products you go for, however, make sure they do what you're expecting. Some vendors boast VPN support on their routers, for example, but only to allow tunnelling protocols through ('passthrough'), rather than terminating them. It's also a good idea to stick with just one make or model, as persuading VPN gateways from different vendors to talk to each other can be difficult.



Broadband routers with integrated VPN capabilities are a good approach when only a few remote users are involved

Mobile workers

Problems can occur with the second type of VPN, where you want mobile users to connect to the network. This is mostly because there's no permanent tunnel, so special client software is needed to create temporary tunnels on each remote PC.

You'll need a central gateway able to support mobile clients, but most do that by default, and finding client software isn't difficult. Windows 2000 and XP, for example, both come with basic VPN clients as standard, although they won't necessarily work with every VPN gateway. Most VPN appliances come with appropriate software, or specialist third-party clients are also an option. Again, though, it's important to check on compatibility before buying.

What certainly can be a problem is installing the client software onto PCs that spend a lot of time on the road. You'll also need to train staff as well as manage the software itself and the encryption keys and certificates required to maintain security. It can be done, but the process is fraught with difficulties and, as a result, a lot of companies now prefer to use an SSL-based VPN solution for this kind of access.

Even if you use the VPN client built into Windows XP, it will still need a level of managing and can't be guaranteed to work with every VPN gateway

With an SSL VPN there's no need for any extra software on the remote PCs. Instead the Secure Socket Layer (SSL) encryption available in Internet Explorer and other browsers is used. Rather than specialist tunnelling protocols, an SSL VPN creates its tunnels using the same HTTPS transport used by browsers to connect to secure websites.

To create an SSL VPN you'll need a gateway on the network and, unlike most traditional VPN products, SSL solutions can't be used for site-to-site connectivity. But there are lots of increasingly affordable products available, such as the Sonicwall SSL-VPN 200 (reviewed on page 150), which can support up to 10 remote users for under £300.

There are lots of affordable remote-access products for small-business users. They're not difficult to track down, are becoming easier to use and well worth the effort. **PCW**

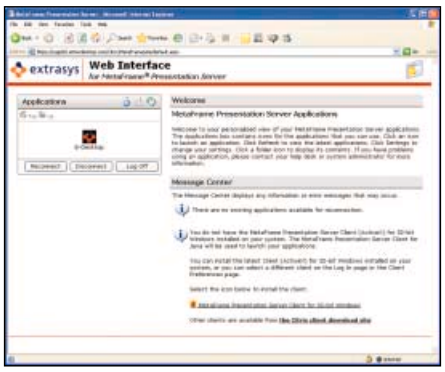
Pros and cons of a hosted service

One approach to remote access is to give up on the idea of having a network, servers and applications of your own and opt instead for hosted services. There are several benefits, not least of which is ease of use, with the technologies involved all supplied and managed for you.

All your company has to do is place an order. All end users need is an internet connection, a browser and, possibly, a little extra client software, to enable them to log on and access their resources from almost anywhere. The service is guaranteed to be available and secure, with the added benefit that you no longer have to maintain your own servers, keep applications up to date and licensed, take backups and so on.

On the downside there's no halfway house. Hosting some users while others connect to local servers merely adds to the workload rather than reducing it. It also makes everyone reliant on internet access, even when working in the office, although you can address this by building extra redundancy into supporting services.

If the idea of hosted applications appeals, it's best to start off conservatively and look at hosting just a few applications to begin with, rather than trying to run everything online.



Service providers such as Extrasys use thin-client technology to deliver a complete Windows Desktop and hosted applications via a browser

For example there are lots of providers offering basic hosted email, some even providing access to Exchange, along with all the collaboration features that go with it. Companies offering this service include 1&1 (**www.1and1.co.uk**), Fasthosts (**www.fasthosts.co.uk**) and Simply Mail Solutions (**www.simplaymailsolutions.com**).

And if you do want to take it further, other online hosting services are available. These include everything from collaboration applications and databases to full customer relationship management (CRM) solutions. Microsoft is shortly to enter this market with Office Live, and its website is worth investigating (**http://officelive.microsoft.com**). You can even get complete hosted Desktops, such as the Extrasys Desktop service we reviewed last October, which uses thin-client technology to deliver a complete Windows Desktop and almost any application you want to run from it in a browser.

SEARCH APPLIANCE

Google Mini 2

Google it yourself with the new Mini

Smaller than ever, the Google Mini 2 is even bigger in terms of indexing and search functionality

Mini by name but not by nature, the Google Mini 2 is a self-contained appliance that allows small businesses to use Google's search technology on their own intranet and public websites. The latest implementation is about half the size of the original, yet more powerful with new indexing and reporting features plus facilities to include network shares in the process.

The Google Mini 2 looks like a bright blue rackmount server, which is exactly what it is. The server hardware is from Supermicro and it runs an implementation of Red Hat Linux. More than that, however, is hard to establish as Google is reluctant to reveal what's inside, and tamper-proof screws mean you can't open it up without invalidating the warranty.

But the exact specification isn't important. Depending on how it's licensed, the same device can index anything from 50,000 to 300,000 documents and, should it ever go wrong, Google will simply swap it. It does, however, cost £695 ex Vat to extend that protection beyond the first year, and owners of the original Mini will need to shell out for a new device to get the updated software.

Installation takes about 10 minutes. A yellow cable is supplied to connect to the local network, and an orange crossover cable for initial setup. After installation you can unplug the orange lead and manage the appliance from any PC on the network. A built-in firewall stops any other access apart from searches, with the Linux operating system tightly locked down for extra security.

Putting it to work is pretty straightforward too. The management interface has been reworked to make it easier to follow, and all you really need to do is to specify the URLs to search, then sit back as the Mini 2 crawls through the data and builds an index. This can take anything from a few minutes to several hours depending on the number of documents.

Some 220 files types can be handled including Microsoft Office documents and Pdf files as well as ordinary HTML pages. And you don't have to sit around waiting for it all to happen. A scheduler helps automate the process and new facilities automatically increase the frequency of crawls on servers subject to lots of changes.

Unfortunately, including Windows shares in the indexing process isn't as straightforward as claimed, requiring a lot of experimentation before we managed to get the syntax right. On the plus side, enhanced reporting tools help when it comes to troubleshooting and all the documentation is on the appliance.

The familiar Google interface is used to search the indexes, with a certain amount of basic customisation possible and a built-in XSLT editor to enable developers to integrate the search engine into their applications and websites.

Search results are returned within seconds with the usual options to order the results by relevance or index date. You can also configure the software to suggest synonyms and perform keyword matching with associated links at the top of the page.

On the downside, some of the more advanced features found on Google's enterprise appliances aren't available. The only way to stop sensitive documents being included, for example, is to protect them behind a proxy server. But then the enterprise devices can be hugely expensive while the Google Mini 2 is both affordable and much simpler to deploy. *Alan Stevens*

Details

Price From £1,521.63 (£1,295 ex Vat), includes one-year warranty and support
Best price www.pcw.co.uk/bestprices
Contact Google 020 8202 2388 www.google.co.uk/enterprise/mini
Specifications 1U rackmount search appliance • Dual 10/100Mbits/sec Ethernet interfaces • Red Hat Linux • Google search engine

Verdict

Pros Google search engine technology; easy to use; indexing of network shares; customisable search interface
Cons Indexing of network shares not as easy as claimed; no upgrade path for existing Mini owners; lacks more advanced features of enterprise search appliances

Features ★★★☆☆
Performance ★★★★☆
Value for money ★★★☆☆

Overall An affordable way for small businesses to integrate Google search technology into the intranet and pubic websites
★★★☆☆

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Available Models :
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- Lightscribe direct disk labelling technology
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- Super fast write and re-write speeds
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Available Models :
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Available Models :
Blue Eye Pro
Blue Eye 2

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MOBILE MULTIFUNCTION DEVICE

HP Ipaq HW6915 Mobile Messenger

Phone, PDA and GPS receiver with Wifi and push email

The Ipaq HW6900 comes with a USB cradle and is a good choice for mobile workers

The Ipaq HW6915 Mobile Messenger is fine if used just as a phone but is easily outclassed by dedicated mobile phones. If you want mobile email, a Blackberry is both smaller and better supported, plus there are better, cheaper GPS receivers, not to mention smartphones that offer similar PDA functionality. If, however, you want all these features and more in one neat and very professional-looking unit, the latest Ipaq Mobile Messenger is hard to beat.

Aimed at the mobile professional, this recently revamped device certainly looks ready to do business. Weighing in at 175g it's a little heavier than a Blackberry and bigger, but still fits snugly in the palm of the hand, with a bright 3in colour screen protected by a transparent flip-up cover. There's room, too, for a full Qwerty keyboard, along with a mini joystick and extra keys to operate the built-in phone independently.

So, pop in a Sim card and the Mobile Messenger becomes a quad-band GSM phone, with a plug-in hands-free kit provided in the box, and Bluetooth support should you need it. Bluetooth can also be used to connect the Ipaq to printers and other devices, as can the integrated infra-red interface, while GPRS/Edge connectivity provides internet and email access on the move.

This model also comes with an 802.11b Wifi interface, which means you can connect to the internet and receive email via hotspots and private wireless networks. A VPN client also comes as standard but, for reasons best known to HP, no softphone to make Voice over IP calls over the Wifi link.

You do, though, get a lot of other software bundled with the Windows Mobile 5 operating system, including mobile versions of Word, Excel, Powerpoint and Internet Explorer. Outlook messaging is similarly built in with support for 'push' email when used in conjunction with Microsoft Exchange, plus facilities to synchronise to a desktop using the Activesync software, also bundled with the unit.

A fast 416MHz Intel PXA270 CPU provides the processing power with 64MB of SD-Ram which can be further supplemented via mini-SD cards. You also get a digital camera and a GPS receiver, plus Tom Tom navigation software.

Of course compromises have been made. For example, finding the right keys to use when dialling numbers can be difficult. Call quality isn't that great either and, call us picky if you must, but your ear leaves marks on the screen during long calls. We also struggled with the GPS features at times, with no way of turning the receiver on and off other than through the navigation software which, if left running, can be a big drain on battery power.

On the plus side we found the screen a delight and, although quite different from desktop Windows, it didn't take long to master Windows Mobile 5. The small keys don't help, but then we mostly used the onscreen keyboard, working up quite a speed using the stylus provided.

A USB cradle and independent charger complete the outfit with the battery good for about a working day between top-ups. As such it's a good choice for mobile workers unwilling or unable to carry a notebook and phone around, especially with the Wifi and GPS functionality built in. However, it's relatively expensive compared with a dedicated phone or Blackberry, especially if on contract, and ultimately not a match in functionality or ease of use. *Alan Stevens*

Details

Price £452.38
Best price www.pcw.co.uk/bestprices
Contact www.hp.com
Specifications Intel 416MHz PXA270 processor • 192MB memory (128MB Ram & 64MB Ram) • mini-SD slot • 3in touch-sensitive colour TFT display • 802.11b wireless, Bluetooth 1.2, Irda and quad-band GSM wireless interfaces • GPRS/Edge support • Integrated GPS receiver • 1.3-megapixel digital camera • Removable lithium-ion battery • Microsoft Windows Mobile 5 for Pocket PC Phone Edition

Verdict

Pros Quad-band GSM, Bluetooth and Wifi wireless interfaces; push email support; integrated GPS receiver and Tom Tom navigation
Cons Limited screen resolution; no independent controls for GPS receiver; low-quality digital camera

Features ★★★★☆
Performance ★★★☆☆
Value for money ★★★☆☆

Overall A comprehensive tool for the mobile business user looking to replace a phone and notebook, but otherwise it doesn't measure up against more specialised mobile devices

★★★☆☆

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NETWORK SCANNER

Kodak Scan Station 100

Walk-up network scanner that gives consistently good results

The Scan Station 100 makes it easy to capture documents from distributed offices and other locations

Take a top selling colour scanner, bolt on a PC and a touch-sensitive colour screen and you've effectively got a Kodak Scan Station 100. However, the real thing also has one or two extras that make it a lot more than a mere sum of those parts.

The first of those extras is the ability to swallow up to 1,000 pages a day; scan each side at a rate of 50 sides per minute; automatically de-skew the resultant images and – courtesy of Kodak's Perfect Page image processing technology – give readable results with even the most, blurred, ragged and tatty of originals.

The Station 100 can decipher the content of documents being scanned and save the results in searchable Pdf files as well as create the more usual Tiff and Jpeg images.

And last, but by no means least, it can email scanned files, send them over the network to a printer and save them to a network share or USB memory stick. All this is done from the touch-sensitive screen using an interface that can be customised to suit different users.

Designed as a standalone device, typically feeding data into a document management system, the Scan Station 100 was very easy to use and we were impressed with the quality of the results, even though some of the originals were poor. The interface is intuitive and the screen can be rotated to suit, a facility we found particularly handy when looking for somewhere to locate the hardware.

Unfortunately the scanner is sheet-fed only, which means you can't scan in books or stapled documents without pulling them apart. However, it's quick and there's no need to align the pages before feeding them in. Plus there's a special attachment to allow ID cards and other thick items to be scanned.

For the sake of security, Kodak has made the network interface operate in one direction only, with no remote setup or management facilities. Instead, a separate Windows application is used to configure the software and the settings are saved to file on a USB memory stick. Just pop this into the Scan Station and it's ready to use. The same approach is used to customise the interface for different users, each of whom can be given their own profile on a memory stick.

The result is a very robust, secure and easy-to-understand solution, which when located in remote offices and warehouses requires very little maintenance. On the negative side, it's not possible to retrieve email addresses from a central directory or troubleshoot problems remotely.

A lack of facilities to email to groups could also be seen as a limitation and, unlike the much cheaper Samsung SCX-5530FN multifunction laser we reviewed last month (see **www.pcw.co.uk/2165844**), you don't get a built-in fax modem. However, an update is due for release shortly to enable scanned documents to be distributed via a network fax package. Enhancements to the naming scheme will also make it easier to recognise documents sent to network shares.

Overall we liked the Scan Station 100 which was very easy to use and gave consistently good results regardless of original quality. However, it's far from cheap and, as such, something of a specialist buy best used as part of a wider document management solution rather than a general-purpose network scanner. *Alan Stevens*

Details

Price £2,078.58 (£1,769 ex Vat)
Best price www.pcw.co.uk/bestprices
Contact Kodak 01442 846 832 www.kodak.com/go/docimaging
Specifications Dual CCD sheet-fed colour scanner • 600dpi resolution • Up to 25ppm • 2.4GHz Celeron D processor • 1GB Ram • 40GB hard disk • 640x480 colour touch screen • 10/100Mbits/sec Ethernet interface • USB2 interface • Scan to email • Scan to USB • Scan to network share • Scan to print

Verdict

Pros Fast, double-sided scanning; rotatable touch-screen interface; Perfect Page image processing; scan to email and network shares; user profiles stored on USB memory stick
Cons No integrated fax modem, group email or remote management

Features ★★★☆☆
Performance ★★★★☆
Value for money ★★★☆☆

Overall Speed and quality are the key differentiators in this easy-to-use network scanner, best used as part of a distributed document management solution

★★★☆☆

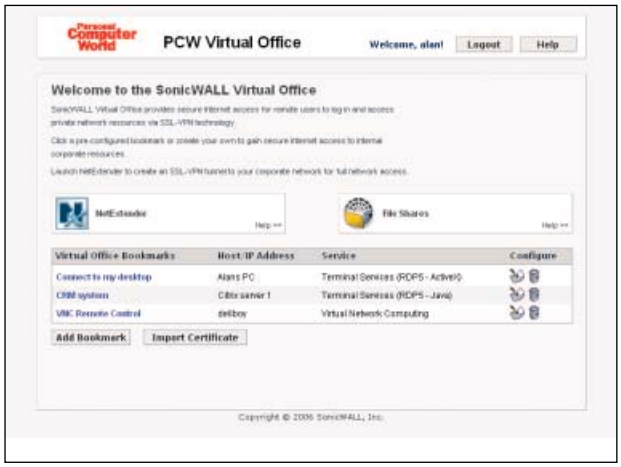
REMOTE LAN ACCESS

Sonicwall SSL-VPN 200

Clientless remote access to Lan resources

Personal Computer World BUSINESS RECOMMENDED

You can connect up to 10 remote users to your network using the Sonicwall SSL-VPN 200



Secure access to the remote network is via a customisable web portal

Small businesses often lack the time and expertise needed to set up and manage a traditional VPN (virtual private network), particularly the special encryption software needed on the remote PCs. SSL-based solutions, however, use the SSL (Secure Socket Layer) encryption provided by browsers such as Internet Explorer and Mozilla Firefox as standard, making products such as the Sonicwall SSL-VPN 200 much simpler to both manage and use.

Designed expressly for small companies wanting to provide remote access to their networks, the tiny SSL-VPN 200 is designed to sit behind an existing firewall. If that happens to be a Sonicwall product then extra filtering and packet inspection can also be provided, but it's not compulsory and we had no problems using it with firewalls from a number of other vendors.

Installation isn't difficult, but it is long winded and our biggest criticism has to be the lack of any automation of the processes involved. Still, with a little bit of trial and error we were soon able to get the appliance up and running using the web-based management GUI and, once that's achieved, the rest is very easy.

There's no need to manually install any software on client PCs. Rather you simply open a browser to connect to the device, typically by specifying a DNS or IP address forwarded to the SSL-VPN 200 by your firewall (you'll have to configure this yourself). You then log on to be presented with a 'virtual office' portal through which you can both browse network shares and run applications.

Authentication is done using either an internal list or an external service such as Radius, NT domains, Active Directory, or Ldap, with access to resources strictly controlled using predefined polices and application bookmarks assigned to particular users or user groups. Trusted users can be allowed to create bookmarks of their own and there are facilities to customise and brand the portal interface by changing the text and adding a company logo, for instance.

Although described as clientless, the SSL-VPN 200 does download small ActiveX and Java applets to do its work. For example, we were able to connect to and manage a server via VNC using a Java applet supplied by the SSL-VPN 200, but it all happens transparently with the applets pushed out automatically and removed again once finished with. However, you are limited in the number of applications that can be run this way and for more general access an optional Netextender client is required.

The Netextender software is installed and behaves just like an ordinary VPN client, but users can install it themselves by clicking on the link provided. It then allows any TCP/IP application to be run, even VoIP, and can also be configured to start independently without a opening a browser.

Unlike most traditional VPN solutions, per-user licensing isn't required with the SSL-VPN 200. It is, though, limited in the number of encrypted tunnels it can handle with a larger version available if you want to support more than the recommended 10 at a time.

And if you want site-to-site tunnelling you'll need to look elsewhere as it's not possible using this device.

Limitations aside the SSL-VPN 200 is impressive. It has a few rough edges but is affordable for small businesses looking to give remote and mobile workers secure access to network resources. *Alan Stevens*

Details

Price £340.75 (£290 ex VAT)
Best price www.pcw.co.uk/bestprices
Contact Sonicwall 0800 0280 488 www.sonicwall.com
Specifications Security-hardened SSL VPN appliance • Five 10/100Mbits/sec Ethernet ports • Recommended 10 concurrent VPN tunnels • Proxies for HTTP/S, Telnet, SSH, FTP, RDP4/5, VNC plus SMB/CIFS file sharing • Optional Netextender client for general TCP/IP access

Verdict

Pros No manual install of client software; granular access controls; customisable portal interface; no user licences required
Cons Long-winded manual installation
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★★
Overall An affordable and much simpler alternative to conventional small-business VPN solutions
★★★★☆

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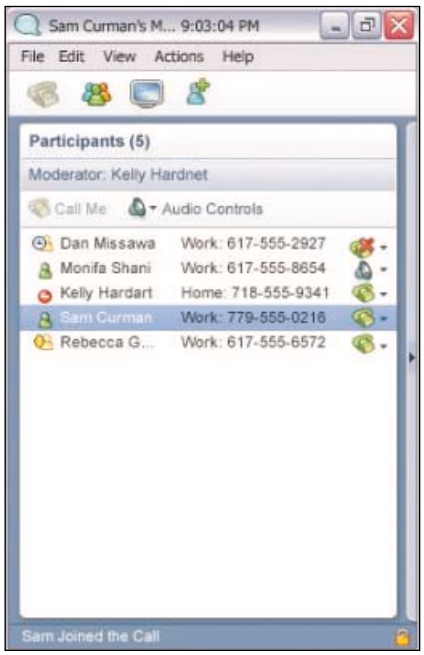
COLLABORATION SOFTWARE

IBM Lotus Sametime 7.5

Personal Computer World BUSINESS RECOMMENDED

It's good to talk, and even easier with Lotus Sametime 7.5



Far left: Users of Lotus Sametime 7.5 can now make conference calls using VoIP

Left: The Eclipse framework underlying Lotus Sametime 7.5 can be extended using plug-ins

Instant messaging (IM) and web conferencing are fast becoming essential business collaboration tools, but public services lack the security many companies look for. IBM's Lotus Sametime addresses this by allowing you to host your own secure IM and conferencing systems with, in the latest 7.5 release, a raft of extra features and functionality.

With this release IBM has completely rebuilt the Lotus Sametime product using the open-source Eclipse development framework. You still need a Domino server but this doesn't have to be used for email, and users can be authenticated against any Ldap service, including Active Directory. Sametime chats can also be logged and archived in an auditable format. Plus there's an optional gateway to securely connect Sametime networks together and provide links to public IM services from AOL, Google and Yahoo.

On the client side Sametime Connect software is available for Windows, Mac and Linux PCs with a slick new interface offering rich text editing, emoticons and, for the first time, a spell checker to help keep everything grammatical. The new client also lets you send documents and other files directly from within a chat window, even capture a part of the screen and send it using IM, which is useful for helpdesk operators trying to troubleshoot problems.

It's also a lot easier to find people in this version with searchable buddy lists and a new business card facility which pops up more detailed information when you hover the mouse over a name.

Screen sharing is another useful collaboration feature, enabling participants to work on documents and run applications co-operatively. Plus you now get Skype-like VoIP (Voice over IP) facilities. So, add a headset and all you have to do is click on a button to talk directly to your IM 'buddies', either one-to-one or as part of a conference call. Similarly you can organise ad-hoc or formal web conferences using Sametime, with a user-friendly management interface that requires very little in the way of technical expertise.

Another big advantage of the Java-based Eclipse framework is the ability to add functionality using plug-ins, both from IBM itself and third-party developers. IBM includes support for presence this way, with the Sametime server working out your location based on where and how you log in. Other users can then see exactly where you are and, if just down the corridor, simply pop in for a chat rather than calling you online.

Other plug-ins can also use the presence information. For example, there's a plug-in to find a restaurant based on your location while within IBM itself users can find out where the nearest printers are in any office worldwide. The list of third-party plug-ins is growing already and the software will also work with the next version of Notes, being developed using the same Eclipse framework, and which will also incorporate a lot more of the Sametime functionality as standard.

For companies already using Lotus Domino, Sametime is an easy and inexpensive add-on. Others, however, may find the need to deploy a Domino server costly and a bit of a chore, although a small-business Express implementation is available. Alternatively you may want to wait for the upcoming Linux server release (due out in the first half of 2007) which will be based on open-source middleware and do away with the Domino dependency altogether. *Alan Stevens*

Details

Price £44.25 (£37.66 ex VAT) per user
Best price www.pcw.co.uk/bestprices
Contact IBM 0870 010 2509 www.ibm.com/lotus/sametime
System requirements
Server: 800MHz Pentium III processor or above • 2GB memory • 1GB free disk space • Windows 2000 Advanced Server or later (AIX and Solaris server implementation also available) • Lotus Domino 7.0 or later.
Client: Windows XP Pro, RHEL 4, Novell Suse Linux Desktop 9.0, Mac OS/X 10.4

Verdict

Pros Secure IM client with rich text and emoticons; VoIP integration; optional gateway to public IM services; extensible plug-in architecture; presence support
Cons Still dependent on Lotus Domino at present

Features ★★★★☆
Ease of use ★★★★☆
Value for money ★★★★☆

Overall A solid platform for secure instant messaging and web conferencing with benefits for small as well as larger companies

★★★★☆

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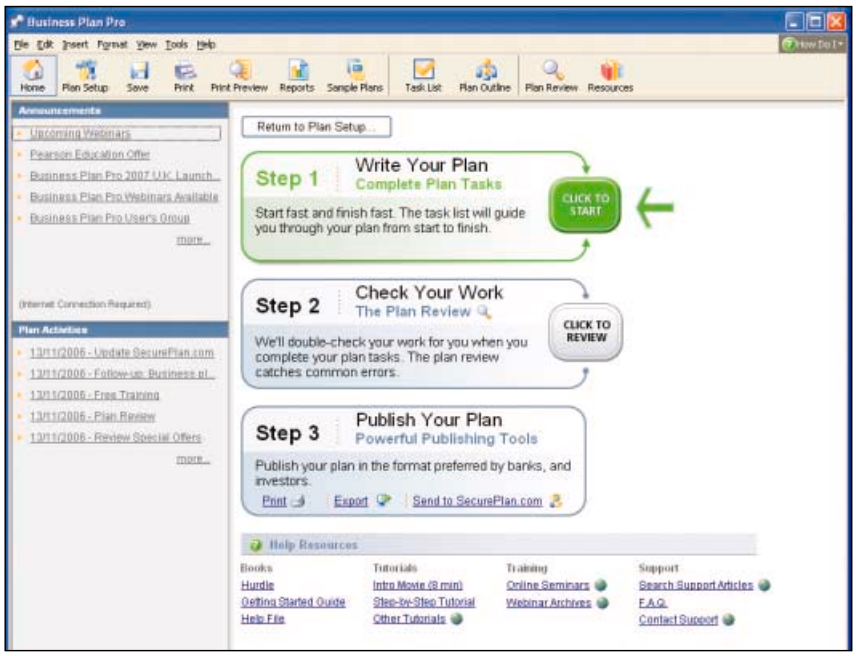
BUSINESS PLANNING SOFTWARE

Palo Alto Business Plan Pro 2007

Professional-looking plans for your business



Business Plan Pro can take care of the mechanics, but the content of your business plan is down to you

Business Plan Pro is one of those products where the name tells you exactly what you're going to get. In this case, you get a set of tools to create a professional business plan which can be used both by budding entrepreneurs and existing companies to garner interest, raise finance and generally encapsulate their business aims.

A word of warning, though. If you're expecting to simply press a couple of buttons and see a finished business plan roll off the printer, then think again. Business Plan Pro can take care of the mechanics, with wizards to guide you through the process, advise on what to put in and what to leave out. It can also help with the design and layout of the document, handle the financial forecasting and show you how others have gone about the process, with over 500 sample business plans included. But it's no substitute for a good idea, and you'll be asked lots of questions to which you'll need to know the answers if the results are to have any credibility.

You don't need fancy hardware to use Business Plan Pro, just a Windows PC, but you will need plenty of time and patience. The program itself is easy to install, the interface straightforward and for speed you could just modify an existing plan. However, few businesses are exactly alike and most users will opt to create a new plan from scratch.

It's here that the patience comes in handy, with a long wizard-driven checklist that you'll need to go through, designed as much to make you think about what's important when setting up a new business as documenting your ideas and making financial forecasts.

To this end the package comes with a useful book, *Start your business week by week*, by entrepreneur Jonathan Elvidge, plus lots of other documents and links to information sources. Tracking down advice on the type of legal entity to go for and the tax implications can be a chore when you first start out, so new tutorials have also been added along with free online training sessions and special offers to, for example, save money on designing your company logo and incorporating a business.

The user interface comes in for a lot of tweaking in the latest 2007 edition and we particularly appreciated the new full-screen mode when we got to the document design phase. The embedded glossary, which helps demystify what can be quite baffling business jargon, is also good.

The plan review process has also been enhanced and we found the overall approach of this package very refreshing. Reading sample business plans also gave unique insights into what was important, while the questions asked by the package further helped concentrate the mind.

We also liked the options in the Premier version (£129.99 ex VAT) to import data from Excel and produce Powerpoint presentations to help get your ideas over.

It's worth just reiterating that Business Plan Pro can't do everything and that the content of the plan is down to you. It needs to make financial sense and it has to be readable, so buy this affordable package by all means but still have the results proofread, and the figures checked out by an accountant. After all, you'll probably only get one chance to pitch your ideas and it's worth the extra effort to present the results of this excellent application in the best possible light.

Alan Stevens

Details

Price £93.99 (£79.99 ex Vat)
Best price www.pcw.co.uk/bestprices
Contact Palo Alto 020 7559 3500 www.paloalto.co.uk
System requirements Windows 2000 (SP3 or above) or Windows XP • 100MB free disk space • 800x600 Super VGA display, 16-bit colour recommended

Verdict

Pros Forces you to think about how you will finance and run your business; lots of supporting documentation and help; sample plans; online training
Cons Long-winded process when starting from scratch; no substitute for a good idea

Features ★★★★☆
Ease of use ★★★☆☆
Value for money ★★★☆☆

Overall A great tool for creating professional-looking business plans, and even if it only makes you think about what's involved it's worth it

★★★☆☆

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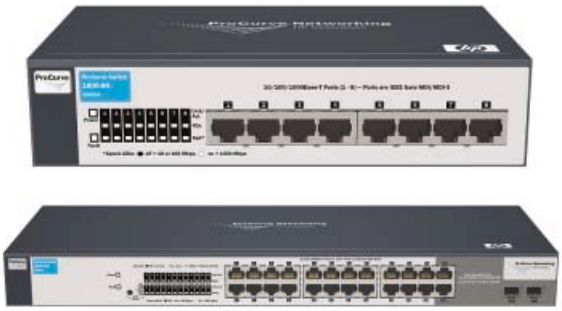
Smarter than your average switch with functionality small businesses will like

Personal Computer World BUSINESS RECOMMENDED



The Switch Series 1800 is designed for businesses wanting more than a basic unmanaged switch but without the complexity of full-on managed products. Two switches are available. One with eight Gigabit ports (see top picture), the 1800-8G, and a larger 24-port model, the 1800-24G. 10/100/1,000Base-T auto-sensing ports have two dual-personality GBIC slots on the 1800-24G for optional fibre uplinks.

The switches are solid and well made and were remarkably easy to configure. There's no local management port or command-line interface (CLI) and only limited read-only SNMP support, leaving just a simple web-based GUI, clearly designed with part-time network managers in mind.

No real expertise is needed and we were quickly able to segment our test network using the built-in Vlan technology and aggregate ports to create high-speed trunks to server farms and other networks. Not quite Layer 3, but easy to understand and set up, with Quality of Service and traffic prioritisation features also built in.

The lack of cooling fans in the 1800-8G makes it totally silent in operation. A small consideration in a packed data centre perhaps, but a major benefit in a shared branch office, school classroom or hospital ward. Unfortunately the extra heat generated by the 24-port model and its built-in power supply makes fans essential, but it's pretty quiet too.

Other vendors have already addressed this 'smart switch' market, but HP has the advantage of the Procurve brand and a lifetime warranty with next-business-day replacement for as long as you own the product. Prices are competitive, making the Procurve Switch 1800 Series a good choice for companies looking for a little bit more from their network infrastructure. *Alan Stevens*

Details

Price £117.49 (£99.99 ex Vat) for 1800-8G; £270.24 (£229.99 ex Vat) for 1800-24G
Best price www.pcw.co.uk/bestprices
Contact HP 0870 241 3625 www.hp.com
Specifications Stackable Layer 2 Ethernet switches • 8 10/100/1,000 UTP ports (1800-8G) • 24 10/100/1,000 UTP ports & 2 dual-personality GBIC slots for fibre adapters (1800-24G) • Web management • 64 VLans • Port trunking • Port mirroring, QoS and 802.1p prioritisation

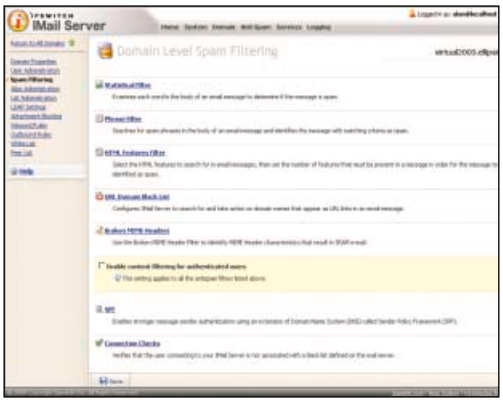
Verdict

Pros Warranty; management; VLan and port trunking; QoS and traffic prioritisation; silent (1800-8G only)
Cons Price of optional fibre-optic GBIC modules
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★☆
Overall Well-featured switch
★★★★☆

EMAIL SERVER

Ipswitch Imail Server Plus 2006

Small-business email server with good anti-spam protection



Imail Server is a very mature small-business email server that supports all the common messaging standards including Pop3 and Imap4. It can be used with Outlook and most other client software, with a web-based client also included as standard. Several different versions are available including the Imail Server Plus product reviewed here, the Plus indicating the bundling of additional 'premium' anti-spam tools.

Support for multiple email domains comes as standard with Imail Plus with users authenticated locally, via Windows domains or against an external ODBC database. A list server is also built in as is support for shared calendars when using the Webmail client. However, if you want to share resources from Outlook you'll need the full Ipswitch Collaboration Suite.

In its favour a lot of small companies don't need collaboration features, just a reliable and secure SMTP mail server, which is what you get with Imail. Another advantage is that there's no need for a powerful host server, although a server implementation of Windows is required and IIS if you want the web-based client.

Installation is quick and easy and once installed the server can be set up and managed remotely from any network PC via a straightforward browser front end.

We were most interested in the anti-spam features. The extensive basic protection is further enhanced by tools from Mail-Filters.com. These tools are activated by default and have automatic updates every 10 minutes.

There's no anti-virus support, which is a major omission. An integrated Symantec anti-virus scanner is available in Imail Server Secure but that adds £305.50 inc Vat to the price. If you have an existing anti-virus solution you're paying twice for the same functionality, which you need to bear in mind when evaluating this otherwise solid email product. *Alan Stevens*

Details

Price From £619.23 (£527 ex Vat) for 25 users
Best price www.pcw.co.uk/bestprices
Contact Computerlinks (UK distributor) 01638 569 706 www.computerlinks.co.uk
Specifications Server with 1GHz Pentium 4 processor or faster • 512MB Ram (1GB recommended) • Windows 2000/2003 server • IIS (version 6.0 recommended) • Browser access to mail requires IE 5.5 or Firefox 1.05 and above

Verdict

Pros Installation and management; standards based; anti-spam filtering
Cons No anti-virus protection; no collaboration features
Features ★★☆☆☆
Performance ★★★☆☆
Value for money ★★☆☆☆
Overall Premium anti-spam but no anti-virus protection
★★☆☆☆

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HANDS ON

SEND IN YOUR QUESTIONS

In 'magazine time' it's now 2007, with 2006 having shot by at an incredible rate. It always amazes me how much information our Hands on gurus manage to pack into each issue – and it also surprises me how much feedback we get for Question time. With several hundred of your emails arriving every month, it's impossible for us to print solutions to all your problems, so our writers carefully choose for publication those that might be relevant to a wider audience.

It's no wonder then that some readers, having not seen a reply to their query in print, have asked whether our Question time section is 'manufactured'.

Well, I can tell you it most definitely isn't, but if you're thinking of writing in please bear in mind that we can't respond personally to everyone, although our writers will do their best to help you. However, we do welcome your queries – and in some cases you might even find them appearing as the subject of an entire column.

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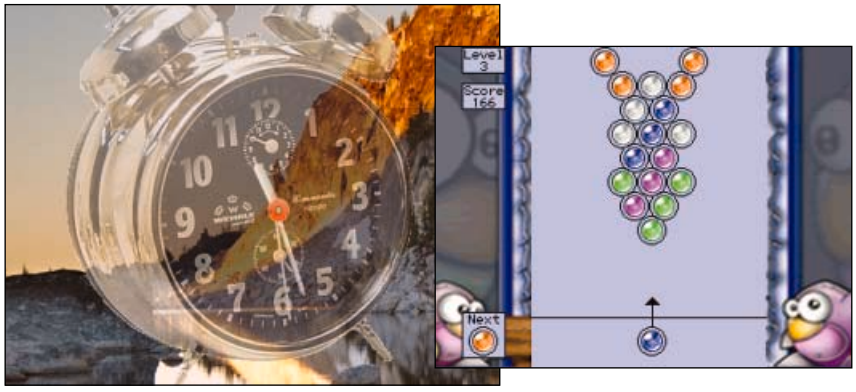

Far left: A new generation of Windows design has interesting results (see page 186)

Left: The Bubbles game on an iPod (see page 172)

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You ask the questions, our experts provide the answers

DIGITAL IMAGING

On the slide

Q I have been trying to make a slideshow from my pictures. I went into Movie Maker and added music and credits. I then put it all onto a disc which will play through my computer, but I want to be able to play the disc through my DVD player to watch on TV. My DVD will not let me play it.
Patricia

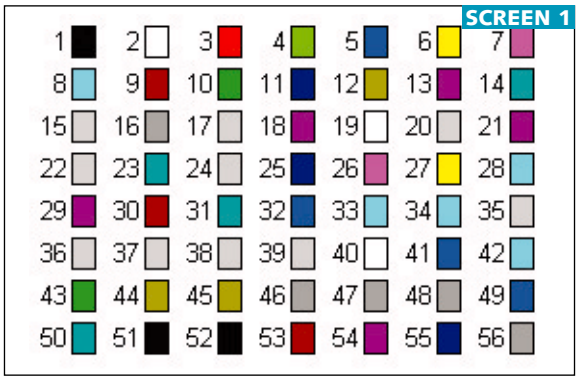
A Some DVD players will play a folder of Jpegs as a slideshow, but if you want to add music, transitions and titles you're doing the right thing by editing the still images together into a movie.

The problem is the output format of the movie you've made. Windows Movie Maker will only encode in Windows Media Video (Wmv) format, which, as you've discovered, you can't play back on your DVD player.

You need an application that can author and encode a DVD video (see our video burning superguide feature at **www.pcw.co.uk/2166225**). Ulead Videostudio 10, Adobe Premiere Elements 2, or Pinnacle Studio 10 will all do a good job. These applications will also allow you to write the original image files to a folder on the DVD, which is useful should you want to print them out.

Stay in synch

Q Our VCR is connected to my Winfast TV2000 XP PVR (personal video recorder) which makes a good job of creating an Mpeg file. This plays back on the computer and the audio is in synch. Then I use Ulead DVD Movie Factory 3SE to create the DVD. At first I thought I had done a good job, but when played back, gradually the audio track gets behind the video, until towards the end, the wrong character is speaking the lines!
John L Hubert



The VBA for Excel colour palette index lists the numbers

A Audio synchronisation seems to be a common problem with Mpeg captures. The easiest solution is, if possible, to recapture the analogue footage using a DV codec. Otherwise, you could try running the files through an Mpeg editor such as Videoredo (see **www.videoredo.com**).

'Windows Media Video format can't play back on your DVD player'

As a last resort, separate the audio from the video in an editing program and adjust the length of the audio track by the final out-of-synch amount. For example, if the audio is two seconds behind the video by the end of the clip, make the audio track two seconds shorter by speeding it up. You won't notice the pitch difference that results from a two-second speed increase over the entire length of the clip.

HARDWARE

XP Media Center

Q I remember a past article in *PCW* about XP Media Center Edition (MCE), which discussed the specific hardware requirements for this operating system to work properly.

Do you know where I can get a list of the compatible hardware requirements that's up to date and decently exhaustive?
Kerry Simpson

A With so many enthusiasts building their own Windows XP Media Center Edition systems, it's easy to forget this is not an operating system that's officially sold to end users. It's designed for OEMs and system builders only, and as such there's no official public website with the information you're after.

Microsoft does of course provide hardware compatibility guides for its OEM customers, but they tend to be on subscription-only websites. If you're interested though, you can check the MCE 2005 page of Microsoft's OEM site at **http://oem.microsoft.com/script/sites/public/mce.htm**.

Luckily for enthusiasts wanting to build their own MCE systems though, there's a wealth of online information written by people who've already done the trial and error. Two of the best sources for this kind of information are the MCE 2005 FAQ of the AV Science Forum at **http://www.avsforum.com/avsvb/showthread.php?t=465419** and the Community at **www.thegreenbutton.com**.

Raiding disks

Q I enjoyed your recent articles on Raid, but it left me with one question: can an average Windows XP Pro installation running off of a single hard drive that's connected to an onboard Serial ATA (Sata) controller be converted to a Raid 1 configuration by purchasing and installing a Raid controller card and a second identical hard drive? Or does one need to 'blow away' the OS installation and start from scratch?
Adam Brothers

A Sadly, if you wish to re-use your existing disk for a Raid array, all data on it will be lost.

Annoyingly, due to the way Windows XP is tied to the disk controller on which it was installed, you can't ghost your existing image to another location, build a Raid array with your two disks, then ghost it back on again. It would now be on a different controller and Windows wouldn't know what's going on.

Additionally, if you'd like to use Raid for your boot volume, you'll need to load the Raid controller's driver as Windows setup is launching. That means connecting a floppy disk drive – and of course having a floppy with the drivers already copied onto it.

HARDWARE

Need for speed

Q I was interested in your article about reinstalling Windows to improve the speed of your system (see www.pcw.co.uk/2165594).

I built a PC four years ago and want it to run faster, but thought upgrading the motherboard would yield much greater results. Do you have any advice?

Chris Pruski

A A motherboard upgrade can certainly deliver great results, but if yours is already a few years old, a new one will almost certainly not be compatible with your existing memory and processor. So buying a new motherboard will also involve buying a new processor and memory, and maybe even a new graphics card. Also, if the overall power requirements of the new system have significantly increased, you may need a new PSU (power supply unit).

Since a new motherboard will almost certainly feature a different chipset to the one you're currently using, Windows XP will also require reinstallation from scratch.

So it's a pretty significant undertaking, but worth considering if you were thinking of reinstalling Windows anyway. But if your PC is a few years old, you may end up only being able to recycle your disks and case.

SPREADSHEETS

Sudoku in Excel

Q Do you know how to construct a Sudoku game with Excel?

Rick Mcphee

A Every time I get on a train there seem to be almost as many people working on Sudoku puzzles as saying very loudly into their mobile phone, 'I'm on the train'. I have never tried it myself but you'll find a free download of a Sudoku game for Excel at **www.glynnconsulting.co.uk/Utils.htm**.

Paint by numbers

Q You sometimes refer to the colours available in Excel by a number. How can I find the number for a particular colour?

Paul Chapman

A Open the VBA for Excel editor using Alt & F11. In the Help box enter PatternColorIndex Property. The palette will be displayed, indexed with the number for each colour (see screen 1). It is used within macro code lines such as

```
If Cell.Font.ColorIndex = 3 ↙
Then
```

(Key: ↙ code string continues)

with the 3 referring to a font in red.

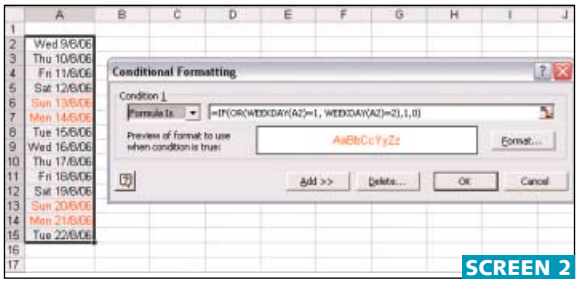
Red letter days

Q I'm using Office 2000 and have a column of consecutive dates. Is there a way to write a macro to highlight the Sundays and Mondays?

I can use Conditional Formatting when the dates are converted to text but it does not work with date numbers.

Mark Mitchell

A Before you resort to a macro try this. Enter some dates in the range A2:A15. Custom format these cells as ddd d/m/yy so you can confirm later that the ↘



Highlighting the Sundays and Mondays using Conditional Formatting

Access all areas

DATABASES

Q I am using Access and I have a set of numbers (called Offsets) in a table. These can range in value from -50.0 to +100.0. After I have entered them, I need to sort them in ascending and descending order. So I open the table and click on the Sort button. This works fine for ascending order but I can't get it to work for descending order. What am I doing wrong?

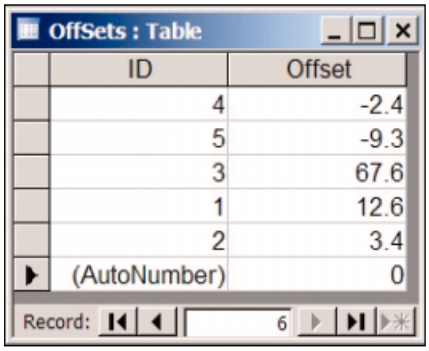
A Almost certainly nothing. I suspect you are using the Decimal data type; if so, that is the problem. This is simply a bug in Access. The Decimal data type is not one that I would recommend using for precisely this reason.

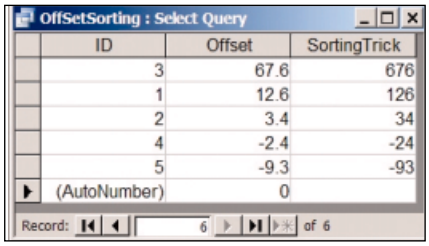
Of course, that's no help to your current problem. The overall answer is to convert the data type to, for example, to the Numeric data type called Single. (Always try this on a copy of the database first, for obvious reasons!) If you don't want to do that, you can create a query that converts the values in the field called Offsets into another data type.

For example, if you create a column as:

```
SortingTrick: Int([Offset]*10)
```

and set it to be sorted, then the rows will be sorted in the correct way.





Top: Incorrect sorting of the Offset field

Bottom: Correct sorting of the Offset field

Conditional Formatting is working with your dates. Highlight the range A2:A15. On the Format menu, choose Conditional Formatting, Formula Is and enter

```
=IF(OR(WEEKDAY(A2)=1,
WEEKDAY(A2)=2),1,0)
```

to complete Condition 1. Pick a conditional format, such as the font turning to red. That will do it. Excel will automatically change the WEEKDAY function address argument for each cell of the range and the Sundays and Mondays will stand out in red (see screen 2).

Dash it

Q At those times when a cell would normally display a zero, how can I make Excel display a dash?
Sam Mack

A You can do this at various levels from global down to cell. For the cell level, highlight the range of cells where you want this to take effect. Click the Centre tool on the Formatting toolbar. On the Format menu choose Cells, Number, Custom. In the Type: box enter

```
0;-0;"-";@
```

(see screen 3).

This will work whether or not you have checked the Zero values box under Tools, Options, View, Window options.

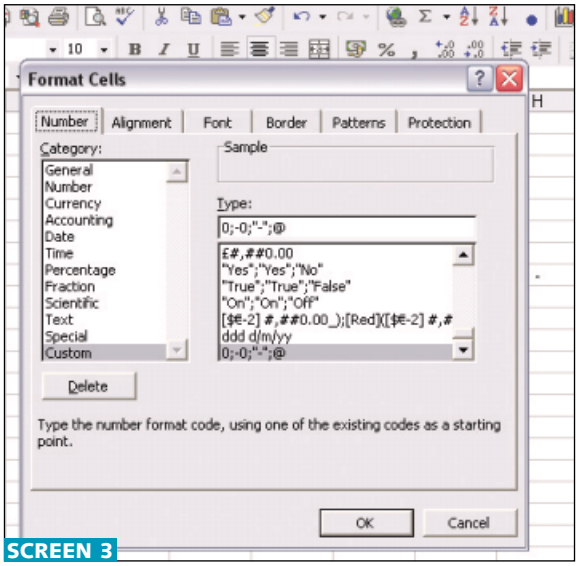
In good invoice

Q We keep a list of our unpaid invoices on an Excel worksheet. The dates of the invoices are in column A. The clients' names are in column B. How can we count how many invoices to a particular client have been outstanding for more than 30 days?
Mike McGowan

A If you have 100 invoices listed, there are labels in cells A1 and B1 and the particular client is Brown Bros. Then you could use the following formula:

```
=SUM(IF(B2:B101="Brown
Bros.",IF(TODAY()-
A2:A101>30,1,0)))
```

As this is an array formula, you enter it using Ctrl & Shift & Enter. This is a nested IF formula. The first IF function looks for the client name. The second one checks to see if the invoice is late. If the name and the date both meet the test, a 1 is stored. The SUM function then counts the ones.



SCREEN 3

Substituting a dash for a zero at cell level

Sum subtotal

Q If an Excel worksheet column includes a number of SUBTOTAL functions, how can I add all the values in the column except the subtotals?
Rod Davis

A Instead of the expected SUM function at the foot of the column, use SUBTOTAL again.

Macro aggro

Q I use Excel 2002 and my macros made earlier in Excel 2000 won't run; I just see a warning about them. Can these macros run under the later version?
Niamh Walsh

A Yes, Excel is just being careful. If you are not on a network controlled by an Administrator, you can solve the problem this way.

On the Tools menu, choose Options, Security and click the Macro Security button. Then check Low. Under the Trusted Sources tab, check Trust Add-Ins and Trust Visual Basic. Save and close the workbook. Close Excel. Restart Windows. Your earlier macros will then run under Excel 2002.

WINDOWS

Files sorted

Q I have a folder with many files with names of the form xxxxxx.xml, where xxxxxx is a hex value between 0-9 and A-F. However, if I choose to sort them by name in Windows Explorer, they don't appear alphabetically – certain files will appear out of order. Re-clicking the column headings has no effect – the files steadfastly refuse to sort themselves. Using dir /on from a command prompt actually sorts them in the correct order.
Martin Dennett

A This sounds like XP's 'Intuitive File Sorting' at work. As any true geek knows, if you have four files named 1file, 2file, 11file, 19file they should be sorted as 1file, 11file, 19file 2file. This 'literal' sorting takes one character at a time – 2 comes after 1, so 2file comes after 19file. If you want them in the former order, then you need to use leading zeroes – 01, 02, 11, 19.

XP makes a friendly attempt to do this without the leading zeroes, so that 2 comes after one but before 11, but this can cause problems in, for instance, your case. The answer is to turn this "helpful" feature off from Tweak UI.

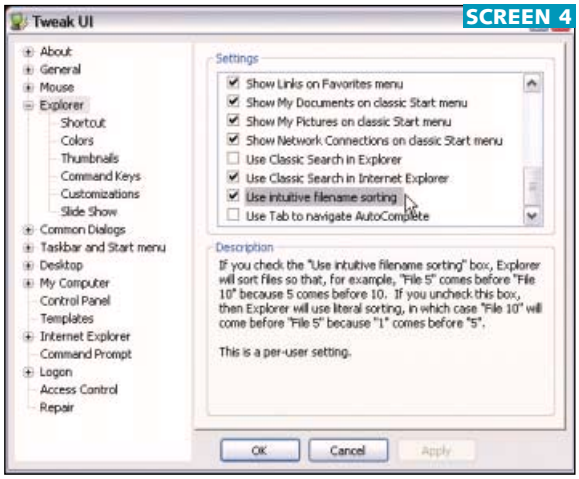
'When a cell displays a zero, how can I make Excel display a dash?'

WORD PROCESSING

File open

Q Is there a way of synchronising Word's File Open view with that of Windows Explorer, so that you see the files in the same format – thumbnails, details and so on – and in the same order?
Jan Hughes

Get back to literal listing by turning off Intuitive File Sorting



SCREEN 4

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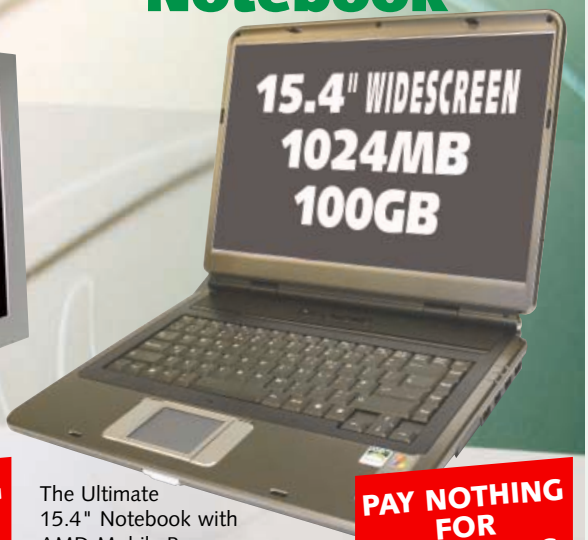

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Between the lines

WORD PROCESSING

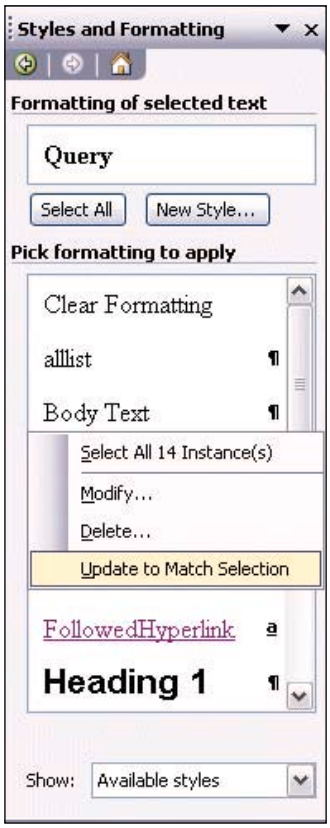
Q When converting a Wordperfect table to Word 2000, an extra line appears before each line of the table. This line is only 0.5 to 1 point deep and doesn't make much difference to the appearance. However, if you try to insert an extra line it puts in one this size instead of a normal line of 10-12pt. Is there any way to delete these lines en masse without having to enlarge the view to about 200 per cent then highlighting and deleting it in every cell separately? If I go into Format-Paragraph and enter 'single' in the line spacing box it makes the tiny line into a full-size one. That then doubles the size of the table so I still need to highlight and delete in each cell.
John Broadhead

A Having experimented with this, we found that the extra line only appears when you open the .Wpd file directly in Word. If you save the Wordperfect file as a Microsoft Word .doc file or as .rtf, it doesn't appear. So this seems to suggest that the extra lines are an artefact of Word's import filter. If the 'Save as…' solution isn't possible then the simplest way to get rid of the extra lines is with Word's Find & Replace. Turn on Paragraph marks from Tools, Options, View and you'll see a paragraph mark – or part of one – at the top of each cell. With the insertion point in the table, go to Table, Select, Table. Now go to Edit, Replace. In the Find box put ^p – the code for a paragraph mark – and leave the Replace box empty. Click on 'Replace All' and the spurious lines should all vanish.

Q In Word 97 I used to be able to create a style, or modify an existing one 'by example', that is formatting some text on the page then going to the Styles dialogue. I can't seem to find the old styles dialogue in Word 2003, or a way of doing this. Can you help?
Michael Neale

A To answer the first question, format your text then open the Styles and Formatting task pane. Right-click on the style in the list and select 'Update to match selection'.

For the second question, the 'New Style' button or right-click 'Modify Style' brings up the familiar dialogue. If you'd like to get at this directly, go to Tools, Customise and click the Commands tab. Select Format on the left list, then from the right list drag 'Styles…' on to the Format menu (see screen).



Updating a style from selected text

A Unlike the native Windows applications such as Notepad, Office programs don't use the common File/Open and Save dialogue, but use their own code. However, you can change the view in a similar manner to Explorer, via the view button in the dialogue (see screen 5). Word will remember the view and sort, order and apply that to all folders.

LINUX

Ubuntu network

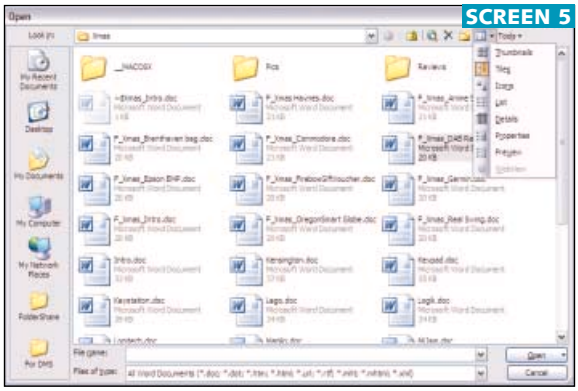
Q I've installed Ubuntu Dapper Drake, and I have a small network at home with a Windows PC and my Linux box. I can access my Windows files from Ubuntu, but not the other way round. I can see the share, but it won't allow me to connect. I've searched around the setting tools but can find nothing to help.
Ian Mansfield

A It sounds as though you have Samba (the Windows networking software) running correctly on your Ubuntu installation, so that's the hard part out of the way. However, to access your home directories you first need to set a 'Samba password' to enable Windows to log in as that user.

As yet there is no graphical configuration tool for Samba supplied with Ubuntu, so open a terminal and run 'sudo smbpasswd -a <user>', substituting your user name. You will be prompted for a password; this can be different from your Ubuntu login password. If you set this to the same as your Windows login password, and the user name is the same on both systems, you will be able to connect to your Ubuntu share just by clicking through. Otherwise, you will need to enter the login details when you initially connect.

For detailed information on setting up Samba for more advanced use, I'd recommend the book *Using Samba*, published by O'Reilly (see **www.oreilly.com/catalog/samba/chapter/book**).

SCREEN 5



You can easily change the type of view in Word's File/Open dialogue to match that of Explorer

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Gordon Laing has been a hardware enthusiast since his first Sinclair ZX80 and as a former editor of PCW and contributor for over 10 years, what he doesn't know about technology isn't worth knowing.

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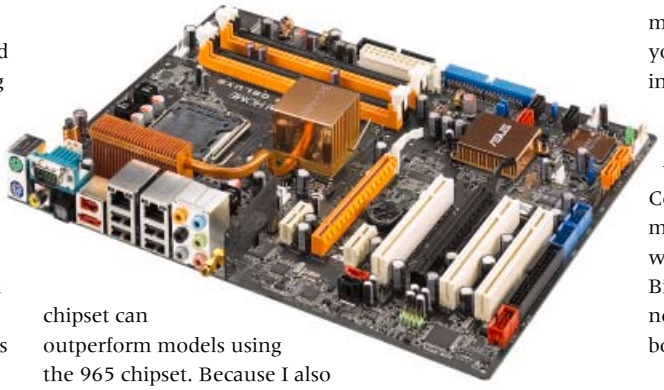
Hard to beat?

Find out if the Intel Core 2 Duo processor really lives up to its impressive reputation

Intel's Core 2 Duo is the darling of today's processor market with good reason: it's quicker, cooler-running and more energy-efficient than its predecessors. *PCW*'s reviews have already confirmed it's a great performer, but how does it compare in terms of power consumption and lower temperatures? Can Core 2 Duo really combine industry-leading speed with environmental friendliness and quiet cooling? Find out in this month's Hardware column.

I put the Core 2 Duo E6700 to the test. Clocked at 2.66GHz, it's the fastest mainstream desktop Core 2 Duo at the time of writing, with only the pricey X6800 Extreme Edition coming in any quicker.

A fast processor deserves an equally fast motherboard and tests have shown those based on Intel's 975X chipset can outperform models using the 965 chipset. Because I also wanted to test the E6700's overclocking capabilities for this month's Performance column, I selected the Asus P5W DH Deluxe motherboard, a 975X-based model that is already earning itself a reputation as an overclocker's delight.



The Asus P5W DH Deluxe motherboard runs well from LGA 775 processors, but Core 2 Duo owners need the new version and Bios

There's one small snag, though. If you're also going for a 975X-based motherboard for a Core 2 Duo system, you must get one that is Core 2-ready in order to support the processor's lower voltage requirements; older versions won't work. It'll also need to run a Bios version that supports Core 2 Duo processors, but beware – many so-called Core 2-ready boards with 975X chipsets still run an older Bios. You can update it, but you'll need an older Pentium to do so (see box, 'Are you Core 2-ready?').

All Core 2 Duo desktop processors operate on a 1,066MHz FSB and, like the older Pentium architecture, this is derived using quadruple-data-rate technology – so the actual external clock is 266MHz. This means the memory, which uses double-data-rate technology, will be effectively run at 533MHz if it's operating in synchronous mode.

What about Speedstep?

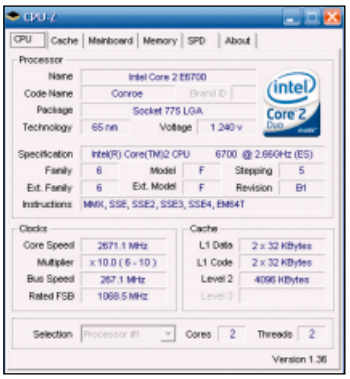
Core 2 Duos support Enhanced Intel Speedstep Technology (EIST), which underclocks the processor during idle periods to save power. The Core 2 Duo E6700 processor tested here uses a 10-times multiplier on a 266MHz bus to achieve its 2.66GHz clock speed. EIST reduces the multiplier to six-times, delivering an underclocked speed of 1.6GHz. Core voltage is also reduced, which should result in lower power consumption.

To support this feature you need to enable EIST or Speedstep in the motherboard Bios and change Windows Power Control Panel to 'Minimal power management'. You can then use utilities like CPU-Z to monitor the multiplier and core voltage change; see **www.cpuid.com**.

I tested the E6700 with EIST enabled and disabled but saw no change in power consumption despite CPU-Z reporting a drop in idle core voltage from 1.24V to 1.136V with the feature enabled (see screens).

With EIST enabled, the Sysmark score dropped from 335 to 302 and the DivX encoding process increased from nine minutes, 15 seconds to 10 minutes, 37 seconds.

EIST has reduced performance in previous tests on desktop processors, so we'll do more and report back.



The Core 2 Duo E6700 without EIST enabled. Note the standard 1.24V voltage, the 10-times multiplier and the core speed of 2,671MHz

The Core 2 Duo E6700 with EIST enabled. With Windows idle, note the lower voltage of 1.136V, the six-times multiplier and core speed of 1,602MHz

Are you Core 2-ready?

The desktop version of Core 2 Duo, codenamed Conroe and labelled with a letter E, uses the same LGA 775 interface as several generations of earlier Pentiums. Unfortunately for anyone hoping to swap their CPU for a brand new one, most existing LGA 775 motherboards are unable to support the Core 2 Duo thanks to its different power requirements.

The Core 2 Duo is manufactured using Intel's latest 65nm process so runs on a lower voltage than older Pentiums. It also demands a more stable power source. LGA 775 motherboards, designed before the Core 2 Duo's requirements were known, are electrically incompatible and it's impossible to upgrade them.

As with many CPU upgrades in the past, you'll need a motherboard that explicitly states compatibility, which for Intel's latest processor means looking for a badge saying 'Core 2-ready'. However, many motherboards claiming Core 2 readiness may not be as ready as you had hoped.

In terms of Intel's own chipsets, the only two that support desktop Core 2 Duos at the time of writing are the 965 and the 975X. The 965 was designed for and launched with the new processors, so all motherboards using it will support Core 2 Duo out of the box.

Intel chipset-watchers will know that the 975X has been used on high-end boards for some time. As you might expect, 975X motherboards that predate the Core 2 Duo won't work with it, and you'll need a modified version that states it's Core 2-ready.

The motherboard will also need a Bios that is aware of Core 2 Duo, but infuriatingly not all 'Core 2-ready' 975X boards run the appropriate version. While updating the Bios is a relatively simple process – especially on modern motherboards that can read one straight from a floppy without booting into Dos or Windows – you will need a system that can start up. Annoyingly though, if you fit a Core 2 Duo into a Core 2-ready 975X motherboard running an older Bios version, it'll refuse to start.

This catch-22 can be solved only by temporarily fitting an older LGA 775 Pentium to boot the system and update the Bios. Once updated, it's plain sailing with the Core 2 Duo, but if you don't have an older Pentium lying around, you could be stuck.

This is what happened to me when testing the Asus P5W DH Deluxe motherboard. It may have been Core 2-ready in terms of power requirements, but it was running an older and incompatible version 0301 Bios. I had to hunt down an older Pentium just to update it to the required 0701 Bios.

So the moral is: if you're building a Core 2 Duo system, it's best to avoid a 975X-based motherboard unless you either know it's a Core 2-ready version running the right Bios, or have access to an older Pentium in order to update it. The safer approach is to go for a 965 model as all versions should support the Core 2 Duo out of the box.

While PC2-4200 DDR2 memory rated at 533MHz would do the trick, I needed something with more headroom to allow for overclocking by increasing the FSB. With this in mind, I fitted 2GB of Crucial Ballistix DDR2 PC2-6400, which can be clocked as high as 800MHz, or 400MHz externally.

Completing the test rig was a Gigabyte NX66256DP Nvidia Geforce 6600 PCI Express graphics card and a 400GB Seagate Barracuda 7200.8 hard disk loaded with Windows XP Media Center Edition 2005. Keeping the processor cool was the big but very efficient Zalman CNPS9500 heatsink (pictured below). The disk, OS, graphics card and Crucial Dimms were the same as those used in previous Hardware column benchmarks, allowing direct comparisons to be made.

Before testing the Core 2 Duo with this configuration, I slipped an older 3.6GHz Pentium 4 model 660 into the Asus motherboard in order to update its Bios and took the opportunity to run a full suite of benchmarks for comparative purposes.

Pentium 4 vs Core 2 Duo

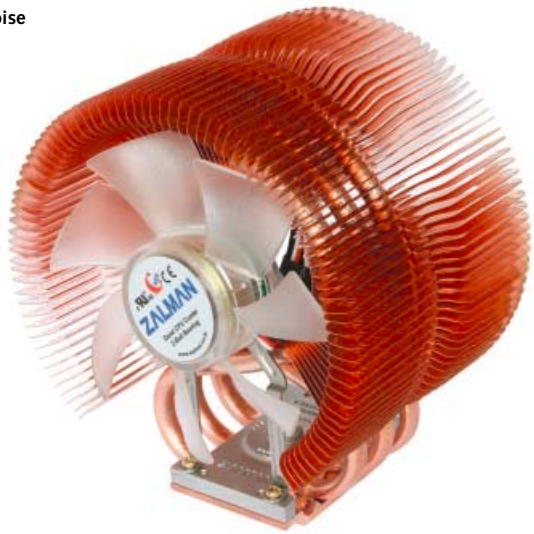
When fitted with the Pentium 4 660 clocked normally at 3.6GHz, the test system scored 217 in Sysmark 2004 and took 13 minutes and 45 seconds to encode a 12.5-minute Vob file into the DivX format. Swapping the Pentium for the Core 2 Duo E6700 clocked normally at 2.66GHz saw a dramatic increase in speed, scoring an impressive 335 in Sysmark and taking nine minutes and 15 seconds for the video encode.

So the performance of the Core 2 Duo was about 50 per cent faster in both tests, despite being clocked almost 1GHz slower. That's clearly an impressive result for the new architecture, but how did it perform in terms of power consumption and temperature?

The Pentium 4 660 configuration consumed 134W when idle in Windows and leapt to 206W while performing the video encode. In contrast the Core 2 Duo E6700 consumed 106W when idle, increasing to 135W under the same full load. That's quite a significant decrease, especially when running flat-out.

In terms of temperature, the large Zalman heatsink is itself an amazing performer and can keep traditionally toasty processors like the Pentium 4 cool without blowing a gale. With the fan spinning almost inaudibly, it maintained a CPU temperature of about 30-40°C. Switching to the Core 2 Duo saw temperatures at the same fan RPM fall to as little as 18°C.

The Zalman CNPS9500 is ideal for keeping modern processors cool with the minimum of noise



Power consumption

These are clearly positive results for the Core 2 Duo, but I compared it with one of Intel's hottest and hungriest earlier processors. In November's edition I tested the T2600 Core Duo mobile processor, which runs at 2.16GHz on a 667MHz FSB. This scored 255 in Sysmark and took just under 15 minutes to encode the same Vob file.

The Core 2 Duo E6700 performed much faster, but it was clocked 500MHz higher. Where the Core Duo mobile processor scored was in power, consuming just 49W when idle and 70W under full load. A lot of this saving was down to using integrated graphics as opposed to a separate card on the Core Duo motherboard, but it shows what's possible if you're not bothered about top 3D performance. **PCW**

Gordon Laing has been a hardware enthusiast since his first Sinclair ZX80 and as a former editor of PCW and contributor for over 10 years, what he doesn't know about technology isn't worth knowing.

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The power of two

Every performance enthusiast wants to know how well Intel's Core 2 Duo overclocks

Intel's Core 2 Duo processor brings many benefits to desktop systems. In this month's Hardware column I compared the E6700 model against an older Pentium 4 and it scored well in terms of speed, power consumption and temperature. But the big question is, how well does it overclock?

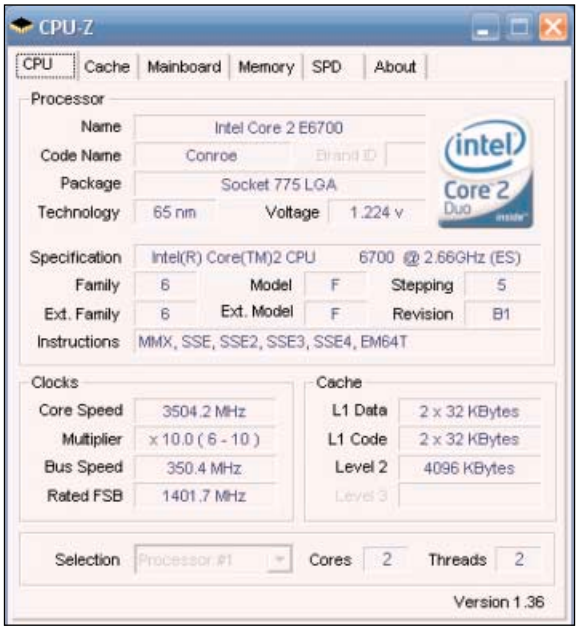
To measure the E6700's overclocking potential I selected the Asus P5W DH Deluxe motherboard. This features an eight-phase power design, which reduces stress on the CPU and power components, allowing both a cooler system and greater overclocking potential.

The P5W DH Deluxe is ideal for anyone wanting to get the most from an LGA 775 processor, but if you want to support the latter, you'll need a recent version of the motherboard which specifically states it's 'Core 2-Ready', and ensure it's running the latest Bios.

I'd be increasing the front-side bus (FSB) to overclock the processor, so I needed memory that could keep up. The Core 2 Duo E6700 runs on a 266MHz external bus, meaning DDR2 memory would operate at 533MHz.

PC2-4200 DDR2 is designed to run at 533MHz, but if you're going to overclock and keep the memory synchronous, you'll need faster modules. I selected a pair of 1GB Crucial Ballistix DDR2 PC2-6400 Dimms. These would support an external bus speed of 400MHz, or 50 per cent higher than the Core 2 Duo's standard external speed.

The rest of the rig matched this month's Hardware configuration: a Gigabyte NX66256DP Nvidia Geforce 6600 PCI-Express graphics card and a 400GB Seagate Barracuda 7200.8 hard disk loaded with Windows XP Media Center Edition 2005. Providing air-cooling duties was Zalman's substantial CNPS9500 heatsink.



The Core 2 Duo E6700 officially runs at 2.66GHz, but we found it easily overclocked up to 3.5GHz without the need for higher voltage or exotic cooling

Pentium 4 comparison

For comparative purposes, I first fitted the motherboard with an older Pentium 4 660 model. Clocked normally at 3.6GHz, this scored 217 in Sysmark 2004.

This processor runs on an 800MHz FSB, which is clocked at 200MHz externally; this external figure is the one to increase in the motherboard Bios for overclocking. I upped it to 220MHz, which drove the processor at 3.96GHz; it booted fine and scored 226 in Sysmark.

In previous tests this was as far as I'd managed to overclock this particular processor, so it was with some trepidation that I increased the bus further. I needn't have worried though, as with the bus running at 230MHz the system started fine, with the CPU clocked at 4.14GHz where it scored 240 in Sysmark.

Overclocking the processor to 4.33GHz using an external 240MHz bus was a step too far and it refused to run the benchmarks even when fed a higher core voltage. It was happy though at 4.24GHz using a 235MHz bus, whereupon it scored 244 in Sysmark. As the motherboard was the only different component since my last tests, I can thank the Asus P5W DH Deluxe for the extra overclocking potential.

Core 2 Duo results

After waiting for the Pentium 4 to cool I swapped it for the Core 2 Duo E6700 and re-ran the tests. Clocked normally at 2.26GHz, it scored 335 in Sysmark.

I was feeling lucky, so I increased the standard external bus from 266MHz to 300MHz. The Core 2 Duo started fine, and clocked at 3GHz it scored 353 in Sysmark. I then edged the bus speed up 10MHz at a time.

With a bus of 310MHz, the CPU was running at 3.1GHz and scored 362. Then to 320MHz where it was clocked at 3.2GHz and scored 369.

Next up, 330MHz, a clock of 3.3GHz and a score of 379, then 340MHz with a clock of 3.4GHz and score of 387. I was wondering when it would refuse to go any further, but got my answer at 350MHz where the system booted at 3.5GHz, but refused to run any benchmarks reliably.

This is still a great result: my Core 2 Duo E6700 managed to overclock from 2.66GHz to 3.4GHz without complaint, nor any need for additional voltage or liquid cooling.

Clearly even the fastest Core 2 Duo has plenty of headroom for overclocking. To get the most from it though, you'll need other components that can keep up. In that respect, the Crucial Ballistix memory and Asus P5W DH Deluxe motherboard come highly recommended. **PCW**

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Tim Nott is a full-time freelance journalist. When he's not writing about Windows and word processing, he tackles many other diverse subjects. He currently lives in France with his wife and family.

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Driving ambition

A step-by-step guide to installing or adding a new disk for extra storage

When I bought my first desktop PC, 16 years ago, it came with a generous 65MB hard disk. When I eventually outgrew this, I paid about £200 for a whopping 200MB drive. This was followed in turn by a colossal 500MB drive and then a truly awesome 1.7GB – each upgrade costing a further £200.

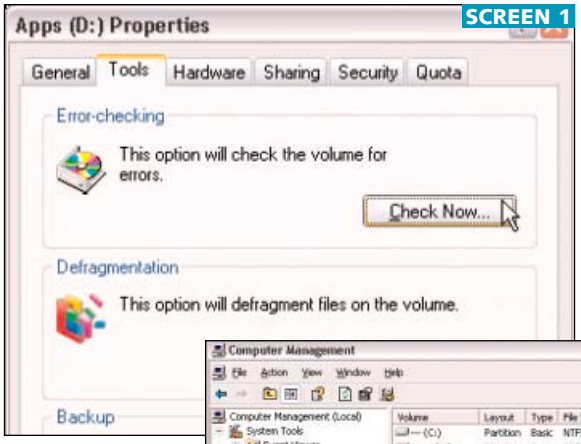
At the time, it seemed as though there was an economic maxim dictating that the cost of an adequate hard disk always be £200. But fast-forwarding to this year, a 160GB drive can be yours for about £50. According to UK Government statistics, this represents pay for five hours' work, on average. But dealing with a failed drive, reinstalling Windows, applications and service packs will take a lot longer than five hours. So, if a hard disk starts to misbehave, it makes economic sense to replace it as soon as possible.

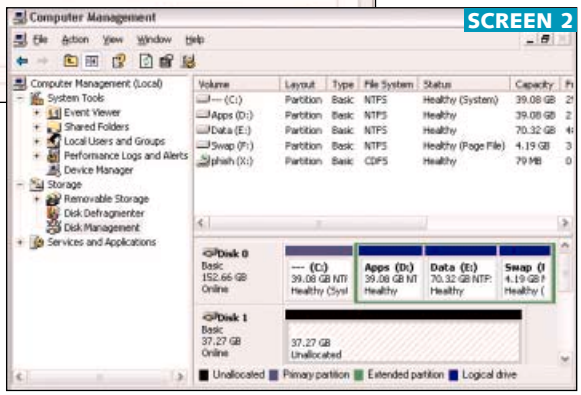
Back in the days of Fat file system, the file fragments recovered by Scandisk as 'lost clusters' with the .CHK extension, were largely useless. You might have been able to recover sections of text, if you were lucky, but that was about it.

Formatting a drive

Under XP and NTFS, things have improved greatly – as I found when my disk began to misbehave (see screen 1). Having run the disk-checking utility from the disk properties, I found it had recovered a number of folders and their contents – including my Quick Launch Toolbar, which had mysteriously disappeared. However, this doggy disk had had its one bite, and I bought a replacement.

The first step was to back up all my data, profiles and so on – I was lucky enough to have access to a USB external drive for this. The next step





Checking a drive in XP is easy

was to check all four partitions on the old drive for errors. When this was done, Windows informed me that drive D and drive E were not formatted – would I like to format them now? As just an hour or so earlier I had been using Microsoft Word, installed on drive D, to edit a document stored on drive E, this came as something of a surprise. Then Windows Desktop Search joined in the fun. It was, presumably, trying to update its index of files on partitions that it could no longer access, and it flashed up a series of messages saying it couldn't cope and would shut down. But it didn't shut down – it just went on generating more error messages, which covered most of the screen. There were 30-odd instances of the Windows Search process running in Task Manager, but after some fairly athletic fingerwork to end these, I was able to regain control.

There is also a command-line disk checker – rather confusingly, it's named chkdsk, which is the same as the Dos utility that was replaced by Scandisk in Windows 95. And, to cut a long story short, this recovered drives D and E. So, I was anxious to install the new hard disk before any more organic fertiliser hit the ventilation system.

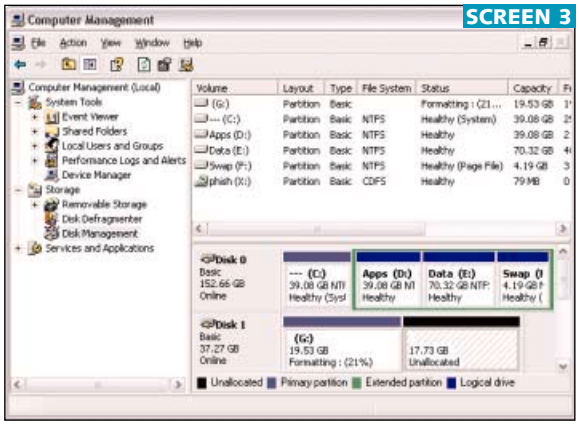
Installing a disk

The first step was to close down and unplug the computer, open the case and fit the new disk into a vacant bay. Next, it needed to be connected as a 'slave'. You should find that the cable connecting the existing hard disk to the motherboard has two connectors at the drive end – the one at the end is the 'master' and the other the 'slave'. Both drives should have their jumpers set to CS (cable select). If that doesn't work you can set each drive's jumper to master or slave manually. You'll also need a spare power connector.

First, find your drives...

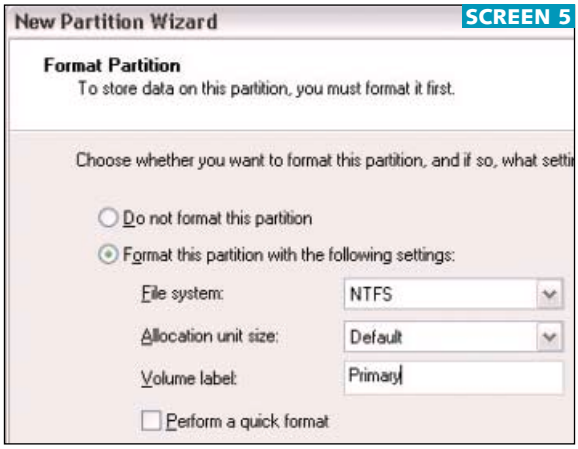
...then create an extended partition

Having connected the new drive and booted up, there are several ways



in which you can transfer the contents of the old disk to the new. My first attempt was with Paragon Drive Copy, from *PCW*'s August CD. However, this still reported my E drive partition as unformatted.

So, instead I downloaded a copy of the Acronis Migrate Easy trial, which is free for 15 days from **www.acronis.com/homecomputing/products/migrateeasy**. It really couldn't be easier – I had the choice of copying all the partitions proportionally to the total size of the old and new disks, or of specifying sizes. Having done that I let it get on with the job. When it had finished, I unplugged the PC, opened the box, made the new disk the master, removed the old one, and that was it.



When formatting the partition we chose the NTFS default

Adding disks

If you want to add a disk for extra storage or replace an existing disk, to reinstall Windows from scratch as per Gordon Laing's 'Ultimate spring clean' (*PCW*, October 2005), then it is rather more complicated, but much easier than the old command-line method.

'If a hard disk starts to misbehave, replace it as soon as possible'

Having made the new disk a slave, as above, make sure that no removable media, such as USB disk drives or card readers, are connected and log on with administrator rights.

Go to Administrative Tools, Computer Management. Highlight 'Storage – Disk Management' in the left-hand pane, and you should see a list of drive letters top-right with a graphical representation of each physical disk below (see screen 2). If you don't, then first check under the View menu that Top is set to Volume list, and that Bottom to Graphical View. You may also need to select Rescan Disks from the Actions menu. Screens 1 and 2 show an old 40GB drive connected as the slave, but the procedure is the same with a larger disk. A new drive may be shown as not initialised – if the Initialize Disk Wizard doesn't appear automatically, then you can run it by right-clicking on the drive in the bottom-right pane and selecting Initialize Disk.

Once this is done all the space on the disk will be shown as Unallocated in the bottom pane. The next choice is whether you want a basic disk or a dynamic disk. The latter is used to store dynamic volumes, which can be used in a mirrored or Raid array – we'll keep things simple by sticking to basic disks.

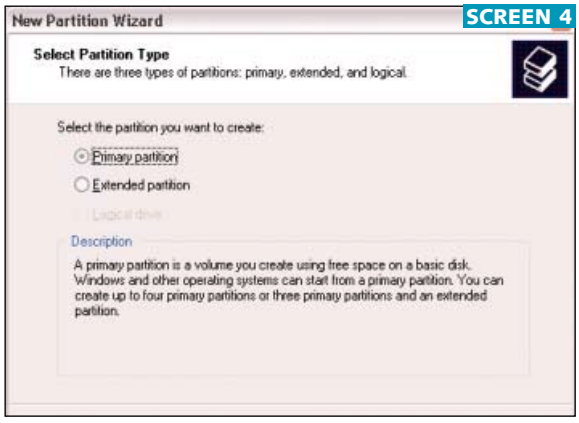
Right-click on the unallocated disk and choose New Partition… which will launch a wizard of that name. The next choice is between a primary partition or an extended partition (see screen 4). You need a primary partition to boot Windows – normally you'd have just one, but if you want to be able to boot additional versions of Windows or other operating systems, you can have up to four. The next stage of the wizard lets you specify the size of the primary partition. This can be all the available space or, if you want to create extra partitions for data, programs and so on, less. For argument's sake, we've set the primary partition to 20,000MB.

The next stage in the wizard lets you select a drive letter or mount the drive in an empty NTFS folder – again, we kept things simple by choosing the default of the next available drive letter – note that we previously set the CD drive to X: by right-clicking on it and choosing 'Change drive letter and path'.

The next stage takes you through formatting the partition – again we accepted the default of an NTFS partition (see screen 5). Here you can summarise your choices and go back if you want to change anything. Finishing the wizard will take you back to the Disk Management window where you can watch as your new partition is formatted. You don't have to wait for the formatting to finish – you can create an extended partition in the remaining space by right-clicking in the Unallocated block, and repeating the wizard – this will then show as free space.

To be able to use the free space you then have to create one or more logical drives – once again, right-click in the free space, choose New Logical Drive… and follow the wizard. Don't worry if you haven't given your partition a name and end up with the default 'New Volume' – you can change this at any time from its properties in Explorer.

If you're going to use the disk for extra storage, that's all you need to do – Explorer will now see the new partitions. If you want to re-install Windows from scratch, you need to make the new disk the master, as above, and reboot the system from the XP installation disk. **PCW**



Choose whether to create a primary or extended partition

A free launchy

I'm a great fan of the Start, Run, box: for things such as MSConfig or Regedit, it's much quicker than trying to find a way in from All Programs. But now I've found something even better.

Launchy has a place in my Start-up folder. It sits in the background until you press Alt & space. Type in a few letters and it will make a guess as to what program you want. If it's wrong, wait a while and it will offer a list of alternatives. Typing 'exc', for example, puts two versions of Excel at the top of the list, and 'moz' offers Mozilla Firefox and Thunderbird. For reasons I have yet to fathom, it seems particularly keen that I should run Smoluchowsky – an obscure Brownian motion modelling program I'd forgotten I had – but it learns as you go and can be taught to look for files and folders as well as programs. It's free, although donations are welcome. You can find it at **www.launchy.net**.

Barry Shilliday has worked with computers for almost two decades. By day, he is a Linux and Unix consultant, but in his free time he prefers to travel the world – and snap it with his camera.

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Rockbox your iPod

A new project based on Linux code can add extra features to your music player

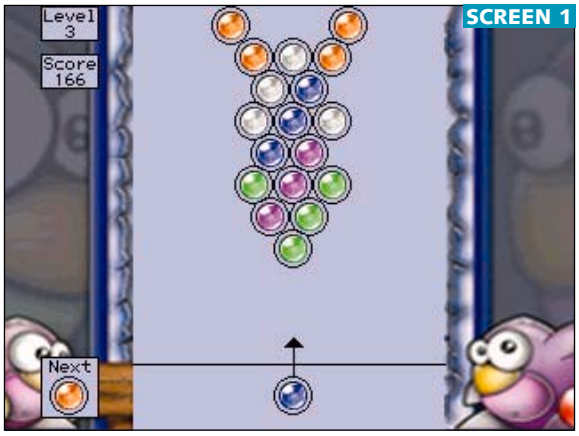
In last month's column we saw how to update the firmware on an Apple iPod or to restore it to factory condition using Linux alone (see **www.pcw.co.uk/2166563**). Over the past few months there has been significant interest and development in a project to replace the firmware on iPods and other digital music players with a fully open-source alternative. This project, known as Rockbox (**www.rockbox.org**), is based around Linux code, and is beginning to offer some tempting features that are not provided by the manufacturers' standard firmwares.

The firmware is the code on the player that controls how it works. In essence it is a small operating system for the player's hardware. Rockbox replaces this with its own code, completely changing the way the player operates. Some of the new features include full support for many audio formats, such as Ogg Vorbis, Flac, mp3, Wav and Aac; gapless playback for audio formats that support it, cross-fading, an advanced equaliser, and a huge number of plug-ins including many games and utilities (see screen 1).

Rockbox is heavily in development, but the daily builds are very stable. There may be a few issues, but you won't do any damage by installing it, and just as with installing Linux onto a computer, you can dual-boot the player with the manufacturer's original firmware. Here we shall look at installing Rockbox onto a fourth-generation (clickwheel) iPod, and how to remove if it you decide to go back to the old firmware.

Rockbox Installation

There are a few steps involved in setting up Rockbox. Although not very intuitive, they are systematic and can be followed easily. The first step is to back up the iPod's boot partition, which contains the original firmware image. Next is to extract the firmware from this partition, and then to combine it with Rockbox's bootloader. After that the new image is written back to the iPod, and the final step is to install the Rockbox system itself. Note that Rockbox works only with Fat-formatted iPods; if you have a Mac-formatted one, either restore using Windows, or refer to last month's column to do it with Linux.



SCREEN 1

The 'Bubbles' game on an iPod running Rockbox

Head over to Rockbox's website and click on the Documentation link followed by 'iPod instructions for Windows users' (**www.rockbox.org/twiki/bin/view/Main/IpodInstallation**). On this page you will find several bootloader binary files; download the appropriate one for your iPod model. In this example it is bootloader-4g.bin, since this is a fourth-generation iPod. Next, head to the Linux iPod installation instructions and download the ipod_fw.c file. This is the utility needed to extract and combine the firmware image. Compile the code with gcc:

```
$ gcc -o ipod_fw ipod_fw.c
```

You will need the gcc compiler installed to perform this step; on Ubuntu Linux enter 'sudo apt-get install build-essentials' to pick up this and several other related packages.

With the files downloaded you are ready to start the installation. First, back up the iPod's boot partition. The iPod has two partitions in total: the first is the boot partition (usually about 40-80MB in size), and the remainder of the disk is taken up with a Fat-formatted data partition. After plugging in the iPod, run the 'dmesg' command to check which device it is using (see screen 2). In most cases it will be /dev/sda or /dev/sdb. Now extract the first partition to the hard drive:

```
$ dd if=/dev/sda1 ↙
of=bootpart.bin
```

(Key: ↙ code string continues)

Next extract Apple's firmware from this image with ipod_fw:

```
$ ./ipod_fw -o apple_os.bin ↙
-e 0 bootpart.bin
```

Some newer models, including the video iPods, require an extra step here. Refer to the Windows installation instructions on the website for details.

Now combine the Rockbox bootloader with the Apple firmware:

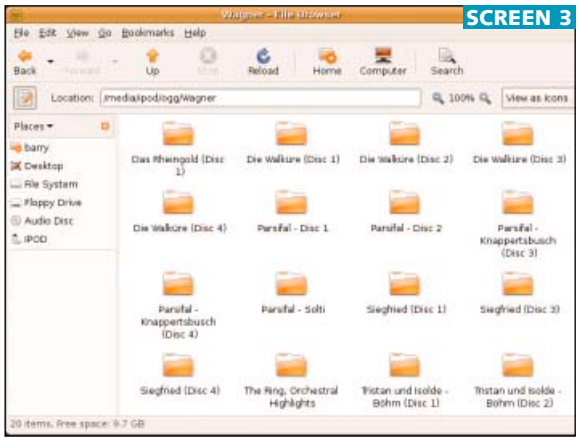
```
$ ./ipod_fw -g 4g -o ↙
rockboot.bin -i apple_os.bin ↙
bootloader-4g.bin
```

The combination command here will vary depending on the iPod model; each command is listed under the Windows instructions on the website. The new boot image will be

Find out the device names for your hardware with dmesg

SCREEN 2

```
barry@eddy: ~
File  Edit  View  Terminal  Tabs  Help
[17191443.816000] usb 2-10: new high speed USB device using ehci_hcd and address
 4
[17191443.952000] usb 2-10: configuration #1 chosen from 1 choice
[17191443.952000] scsi1 : SCSI emulation for USB Mass Storage devices
[17191443.952000] usb-storage: device found at 4
[17191443.952000] usb-storage: waiting for device to settle before scanning
[17191448.952000] usb-storage: device scan complete
[17191448.956000]   Vendor: Apple     Model: iPod              Rev: 1.62
[17191448.956000]   Type:   Direct-Access                     ANSI SCSI revisio
n: 00
[17191448.960000] SCSI device sda: 39063023 512-byte hdwr sectors (20000 MB)
[17191448.960000] sda: Write Protect is off
[17191448.960000] sda: Mode Sense: 64 00 00 08
[17191448.960000] sda: assuming drive cache: write through
[17191448.968000] SCSI device sda: 39063023 512-byte hdwr sectors (20000 MB)
[17191448.968000] sda: Write Protect is off
[17191448.968000] sda: Mode Sense: 64 00 00 08
[17191448.968000] sda: assuming drive cache: write through
[17191448.968000]  sda: sda1 sda2
[17191449.412000] sd 1:0:0:0: Attached scsi removable disk sda
[17191449.412000] sd 1:0:0:0: Attached scsi generic sg0 type 0
[17191450.264000] FAT: utf8 is not a recommended IO charset for FAT filesystems,
 filesystem will be case sensitive!
[END]
```



called rockboot.bin and will provide a dual-boot setup for the iPod. Write this back to the boot partition:

```
$ dd if=rockboot.bin ↙
of=/dev/sda1
```

Add music to Rockbox by copying directories of music files

Finishing up

With the Rockbox bootloader installed, all that remains is to copy over the latest version of the system. Head back to the website and click on 'daily builds', and download the build for your model. This sits on the data partition of the iPod, which in most cases should be mounted automatically when you insert the player. Run the 'mount' command to confirm where the iPod is mounted; in

'Rockbox is beginning to offer some tempting features'

this example the device is /dev/sda2 and the directory /media/ipod:

```
$ cd /media/ipod
$ unzip ~/rockbox.zip
$ cd
```

If you want the absolute 'bleeding-edge' version, click on 'CVS builds' instead to download the version with the most recent changes.

Finally, eject the iPod by running 'eject /dev/sda2' (or the equivalent device), or by right-clicking on its Desktop icon, and then unplug it. It will automatically reboot and go straight into Rockbox if all is well. To restart the iPod, press and hold the menu and select keys; to force the original firmware to load, hold down the menu key during start-up.

Rockbox players use a straightforward disk approach. Simply copy your music across to the mounted player as you would any USB disk and Rockbox will let you play any of the files (see screen 3). When playing a music file from a directory it automatically creates a dynamic playlist of all files in that directory. A 'tagcache' system is in development, which provides a tag-based display for your music. See the website for further instructions on setting this up.

Removing Rockbox is simple. Delete the files from the mounted disk, and restore the backed-up boot partition made during installation:

```
$ dd if=bootpart.bin ↙
of=/dev/sda1
$ cd /media/ipod
$ rm -r .rockbox
$ rm rockbox.ipod
```

Eject the iPod and unplug it from the computer, and it will be restored to its former condition.

The website has detailed documentation for every supported digital player, together with screenshots of some of the games and utilities provided. Rockbox is updated daily so check the site for the latest information. **PCW**

Software repositories explained

Lately, we have been concentrating largely on the popular Ubuntu Linux distribution. A number of readers have been confused by the concept of repositories and how to set them up. These are inherited from Debian (**www.debian.org**), the distribution Ubuntu is based on. Repositories were created to make software installation easier, and to avoid the 'dependency hell' problem suffered by distributions based on Red Hat Linux and using the RPM package management system. When installing a package, it was common for it to depend on several others, which you would have to find and download yourself. Once done, you would find that these packages could depend on others, and so on.

Debian instead uses software repositories. These are essentially just arbitrary collections of packages. They can be grouped in any way; for example, Ubuntu's 'main' repository holds all fully supported packages available for Ubuntu (and its official derivatives such as Kubuntu). Another Ubuntu repository, Universe, holds thousands of unsupported applications that are nonetheless provided to work with Ubuntu. It's possible to include as many repositories as you want, and the package manager will maintain a list of every package available in them.

Each package in a repository can list other packages it depends on, even if they're not in that repository. It's quite common for packages in Ubuntu's Universe to depend on others in Main. This means that when you go to install something from Universe that depends on several other things, the package manager will automatically find, download and install them for you. This becomes especially convenient when installing more complex pieces of software. For example, you can install the entire KDE Desktop in Ubuntu with one command; the automated dependency resolution means everything else is installed without the need for any intervention from you.

Repository information is held in the /etc/apt directory. Inside here is the file 'sources.list', which lists each repository the package manager (Apt) knows about. Every repository begins with the word 'deb' (or 'deb-src' for source code), followed by a URL, directory or CD-Rom name where the repository can be found. After this is the distribution's name (such as 'dapper' or 'edgy'), and finally the name of the repository ('main', 'universe', etc).

You can edit the file directly in a text editor, or use a utility such as Synaptic or Adept to change it via a graphical interface. Newer versions of Ubuntu use the /etc/apt/sources.d/ directory. Rather than edit a single file, you can place individual files with repository information inside this Ubuntu directory, which helps to keep things clear.

When the list of repositories is changed, Apt's package information needs to be updated. Do this by running 'sudo apt-get update'; Apt will then head off to each repository and download index files before building a new list.

While the idea of repositories is fairly simple, it adds a powerful feature to the distribution, making installation incredibly easy. Rather than having to download anything manually, all the user has to do is ensure the necessary repositories are registered. This is one reason many people are choosing Ubuntu over its peers.

Ken McMahon is a freelance journalist and graphic designer. His involvement with digital cameras began with a Commodore 64. He graduated to Macs and Now works mostly with PCs.

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And the Bafta goes to...

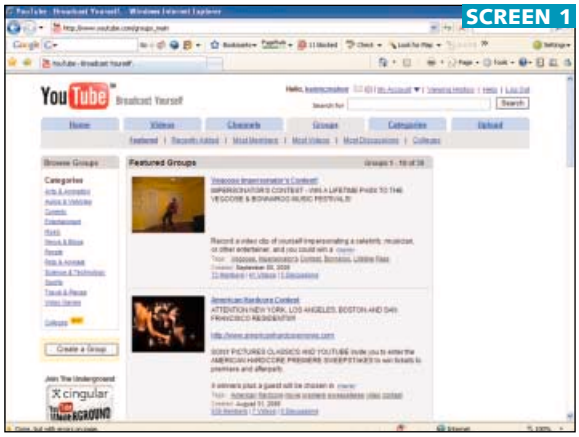
Before you commit to filming a video, find the right video-hosting site for you

For some it's a personal thing, others see it as a route to fame and celebrity – or at least an audience for their awesome talent. Whether you fancy yourself as the next Scorsese, Dylan Moran, or Will Young, or simply want to show your folks the wedding video without having to actually visit them, online video hosting is the way to go.

Since the rise of Youtube, online video hosting has exploded and if you're looking for an audience for your movies, there's no shortage of hosting services from which to choose. Most hosting services will help you achieve the widest possible audience. If you want to share personal videos with family and friends, however, some provide good privacy features. And if you fall into the viewer category, you'll find sites that categorise content and allow you to carry out tag-based searches to find what you're looking for.

Youtube

Probably the best-known video-hosting site is Youtube (see **www.youtube.com**). Launched in February 2005, it has grown rapidly to become, according to **Alexa.com**, the tenth most popular site on the web and, according to Youtube, is serving 100 million videos a day (see screen 1). Youtube is one of the most feature-rich video sites: you can tag videos and comment on them, add them to a favourites list and subscribe to users whose videos you particularly admire. Of all the video-hosting sites, Youtube appears to have the most robust privacy options which work in a very similar fashion to those on Flickr, the Yahoo-owned photo-sharing site. You can assign people to a friends or family contact list, or set up additional lists. Then, when you upload a video that's not intended for public consumption, decide to which list it should be made available.



Youtube has strong 'community' features

Youtube (which as we went to press had just been bought by Google) gets its revenue from advertising but is also encouraging commercial content providers. In September it signed a contract with Warner Music Group to commercially distribute Warner's music videos.

To stamp out copyright infringements, Youtube implemented a 10-minute limit on the length of uploaded clips. If you're a serious amateur film maker and want to upload longer clips you can apply for a free 'Director' account, which allows longer uploads as well as other features, such as your own logo and URL link.

Google Video

Google Video provides fewer 'community' features than some other video-hosting services, so you won't find groups or channels, but you can rate clips, add labels and, naturally, search for content (see screen 2). Clips are also categorised by genre and can be located by a search of the type, for example, genre:comedy.

Most of the content on Google Video is free and uploaded by individuals. There's also a smattering of indie record label band promos, TV show trailers and the like. But despite the fact that Google Video makes providing paid-for content easy, there is, currently at least, not that much of it about. Where paid-for content is offered it's often as a high-resolution option on a clip that's available free at low resolution. I could be wrong but, even at 99 cents, I can't see there being many takers for the Margaret Becket interview, which was the first piece of paid-for content I managed to dig up.

That's not to say there isn't plenty of commercial content on Google Video. One of Google's strong points is that, alongside the current clip, there's a pane that can be configured to display comments, a playlist, other material from the same source, or related clips. Google is also international – which means that if you can't find what you're looking for on the UK site, you can try the US, or any of the European sites.

As you might guess, searching is Google Video's strong point

Jumpcut

Jumpcut.com is a video-sharing website with a difference: you can edit online (see screen 3). It allows you to edit not just your own movies, but other people's too. So if you see a movie that you like, but think it would

Edit footage online at Jumpcut.com

be improved if the beginning was at the end, you can change it and post the result. Other people can edit your movies too, unless you don't want them to. And you can use any part of any public movie as a source clip, which can produce some interesting results.

One of the shortcomings of the service is that with all this cross-editing going on, privacy issues can get complicated. For example, if you upload a movie that's private, then use an excerpt from it in a public movie, the whole of the previously private movie becomes public. So, you need to maintain a clear separation between what you want people to see and what you don't. Possibly the safest bet is only to use Jumpcut for material that you want in the public domain.

Free server space

Most video-hosting services, with perhaps the exception of **jumpcut.com**, provide free video server space and a variety of features to add value to the experience of video sharing for both content providers and viewers. You'll have to decide which one offers a service that's best suited to your needs (see Hosting websites box). If audience reach, community features and privacy options rank high on your features list, then your best bet is to go with Youtube.

Formats and limitations

Most sites, with the exception of Google Video, implement a limit either on encoded file size or running time – or both. Youtube's limit is 10 minutes and 100MB, the exception being for Director accounts, to which the time limit doesn't apply.

If it's an audience you're looking for, unless your movie is exceptionally captivating, it's unlikely many people will get beyond the first minute or two, so it pays to keep it short anyway.

For longer movies you should comfortably be able to fit 10 minutes-worth of good-quality video at 240x320 resolution into a 100MB file using the Windows Media video (Wmv) codec or Mpeg4 codecs, such as DivX or H.264.

If you've just finished your first full-length feature and are frustrated by the 10-minute rule, there are two ways around this. One is to get a free Youtube Director account. The alternative is to upload your magnum opus in several 10-minute instalments.

One thing you don't need to worry about is whether or not viewers will have the necessary codec installed to play back your movie. Most of the hosting services get around this by transcoding, or wrapping your video in a plug-in player. Google, Youtube and Go Fish convert movies to a Flash Video file (Flv) so anyone with the Flash player installed can watch it.

Tags, groups and value added

Video-hosting services are more than just disk space repositories for video files. Like their photo-sharing forerunners, most offer searching and social networking features that enhance the experience for video producers and viewers alike.

Nearly all of them categorise videos into familiar groupings and allow you and others to add tags. Tags make searching possible, but they also provide other interesting ways to make use of so-called 'folksonomies' – essentially, taxonomies with categories defined by the users, rather than imposed from above.

Privacy

While there will always be those for whom the only point in uploading video is to get as wide an audience as possible, others will want to restrict access to their, ahem, private and personal video recordings to friends and family. For the former, pretty much every hosting site will make your video available to anyone.

The best way to maximise your audience is to make a great movie that everyone will want to watch. Other than that you can tag your movie, so people who are interested in, say, movies of Swedish divers catching a lobster, (1,611 of them, at the last count), or a cannon that fires loaded beer cans at a variety of objects including a TV, a vase of flowers and a portable CD player (nearly half a million viewers) can find such things easily.

Another thing you can do to encourage traffic to your work is to blog your video. Most sites provide a facility to post videos directly to a blog and provide cut-and-paste HTML snippets so that you can either link to the page from another site, or link directly to the video file.

As well as providing a wider audience for your movie this is a handy way around ISP disk space limitations and allows you to serve video from a website without the effort involved in setting up a streaming video server. **PCW**

Hosting websites

www.youtube.com
www.video.google.co.uk
www.gofish.com
www.stage6.divx.com
www.clipshack.com
www.putfile.com
www.ifilm.com
www.jumpcut.com
An in-depth table of features for these online hosting sites is at **www.pcw.co.uk/2166064**.

Copyright issues and ownership rights

One of the issues you need to be aware of when uploading video material to a sharing site is copyright.

Copyright law prevents you from publishing anything in which you don't own copyright without permission of the copyright holder, and includes all broadcast material. You own the copyright in anything you shoot and edit yourself (unless you transfer it to someone else).

There may also be restrictions on the use of video recordings that feature individuals, that is actors, or members of the public, or are shot on private property. Quite apart from the legal situation you also should take care to respect the privacy of those in your video recordings.

If you're in any doubt about the situation, I'd strongly advise you take professional legal advice.

Tim Nott is a full-time freelance journalist. When he's not writing about Windows and word processing, he tackles many other diverse subjects. He currently lives in France with his wife and family.

→ Comments welcome on the Word processing column.
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Word takes a pasting

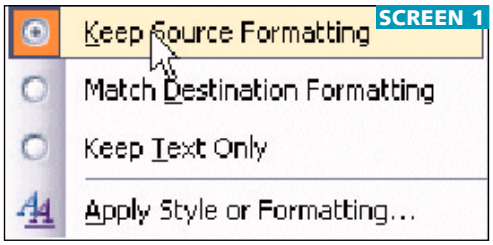
Discover how to paste text without the formatting; plus shape-shifting on text boxes

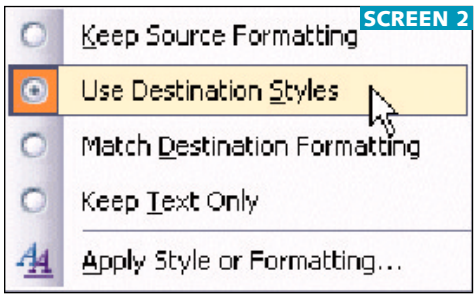
One of my pet annoyances in Word is that pasting text automatically defaults to preserving its source formatting. This isn't so bad if you are copying within a document, or between your own documents which use the same styles, but it becomes an irritation when you are pasting text from an email or stealing chunks of text from a web page for your school homework. If you use Word XP or 2003, then you have the Paste Options button that pops up next to pasted text. Click on this, and you will have options to Keep Source Formatting (the default), Match Destination Formatting or Keep Text Only (see screens 1 and 2). This is for normal text – you may be offered other options within numbered lists.

There's a subtle difference between the last two options. In general, when pasting from and to a Word document, Match Destination Formatting will cause the pasted text to assume the paragraph style of the surrounding paragraph, but keep any character formatting, such as bold or italic. Keep Text Only strips all character formatting, as well as hyperlinks. In general, copying and pasting within the same document is painless, but there are a few things to watch. If you copy a paragraph marker with the preceding text, then you will copy the paragraph formatting. By default, Word does this automatically. If you turn on paragraph marks from Tools, Options, you'll see that as you select a paragraph the selection jumps to capture the paragraph mark – if you turn the option off (Tools, Options, Edit – Use Smart Paragraph Selection) then you have to select the paragraph mark deliberately.

However, our experiments found that if you paste a paragraph (with its mark) into another paragraph, a new paragraph isn't created and the destination formatting is retained. Similarly, if you copy a section break, the pasted result will assume formatting, such as page layout, from the source.

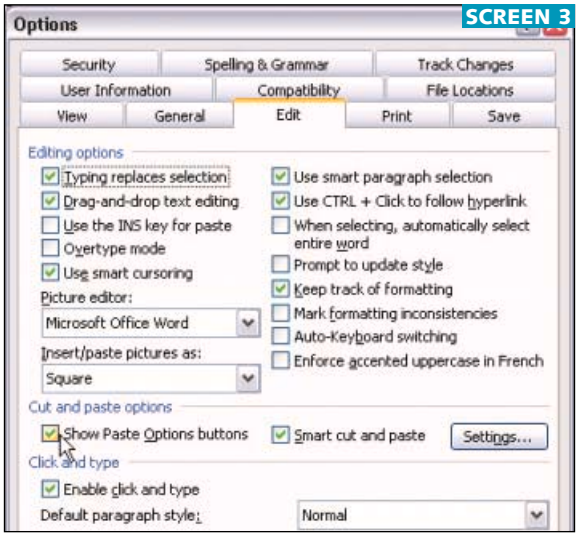
Pasting from an external source – particularly HTML – brings a range of new challenges. Usually, but not always, the pasted text will assume the font of the surrounding text, but retain things such as emphasis, indents and spacing. If you paste several headings and paragraphs, you'll (sometimes) get a fourth option in the Paste Options button, 'Use Destination Styles'. By choosing this Word will try to assign styles existing in the document or template to the pasted text.





Top: Paste options in Word XP and 2003

Bottom: More options when pasting



Many people find the Paste Options button distracting and awkward to use. Although it stays in place until you start typing again, so that you can try different options to see how they look, you may already know exactly what you want. You can turn the button off from Tools, Options, Edit (see screen 3). Note that this affects other Office applications, so you won't get it in Outlook or Excel, where it may be more useful.

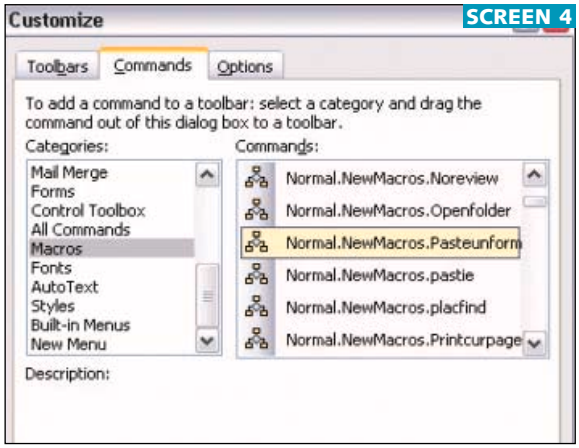
Whether the button is on or not, you can still use the Paste Special command to choose how you want text pasted: and if you are running Word 2000 or earlier this is the only way. However, it's tiresome to go to Edit, Paste Special to make your choice. To paste 'As plain text' directly, you need to create a macro. You can do this by recording the actions of Edit, Paste Special, Unformatted Text or for simpler, cleaner code use this:

```
Sub Pastetext()
Selection.PasteSpecial ↙
DataType:=wdPasteText
End Sub
```

(Key: ↙ code string continues)

You can assign the macro to a toolbar button or, more usefully, the right-click menu. For the latter, go to Tools, Customize and turn to the Toolbars Tab. Tick 'Shortcut Menus' and a block of three menus – Text, Table and Draw. Open the Text menu then the Text item. This will produce the standard text right-click menu, which will remain open when you take the mouse off it. Now go to the

Banishing the Paste Options button



SCREEN 4

Getting a macro onto a toolbar or menu

Commands tab in the customise dialogue, and select Macros from the left-hand list (see screen 4). From the right-hand pane drag your macro onto a suitable position on the open menu. Once in position you'll find it has a less-than-friendly name, such as Normal.NewMacros.Pastetext. Right-click on it and you'll be able to rename it to something snappier.

Yet more table-turning...

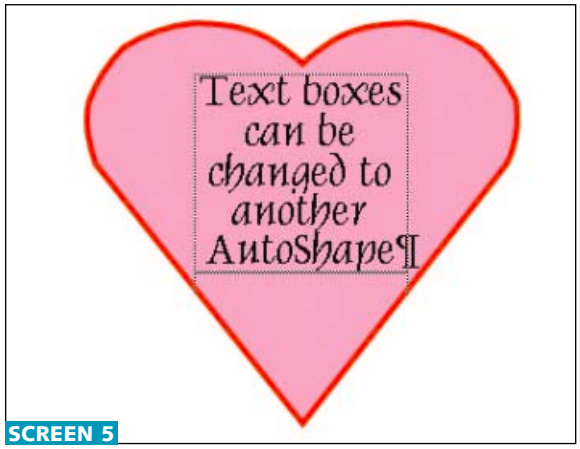
Following our October column, another solution to landscape tables with portrait headers and footers comes from reader James Clarke. And, as with many of your suggestions, it shows admirable lateral thinking. The solution he uses is to interchange the row heights and column widths, then rotate the text in the cells to suit. As James admits, it takes a little getting used to. The key stage is planning – depending on whether it's a left or right page, and if you want to have the top of the table at the inside or the outside, you need to place the logical top-left cell accordingly. Placing the screen on its side or lying down on the desk can help too.

Another regular correspondent, Roger Castle-Smith, came up with a novel way of filling out paper forms. He scans them, imports the image into Word, resizes the image if necessary, and then superimposes text boxes over the fields to be filled in. This presents several advantages. First, we must remember that most forms are designed by sadists, who have twin design aims: that the form should be difficult to fill in – "Ha, let's see them try to cram 16 digits in that box without a 0.1mm drafting pen." Second, it should be ridiculously easy to make mistakes, and thus mess up the entire form.

Roger's solution means that you can change the font size in any text box to suit the space available. And since all the text remains editable, you can correct mistakes before printing. One obstacle is that you need to format each text box so there is neither fill nor outline. Roger used a macro to do this, recording the actions of formatting a text box accordingly, then editing the macro to remove everything – including size and position – except the lines:

```
Selection.ShapeRange.↙
Fill.Visible = msoFalse
Selection.ShapeRange.↙
Line.Visible = msoFalse
```

By selecting subsequent text boxes and running the macro, he was spared the effort of manually formatting each one. However, there's an easier way. Format the first box, then right-click on it and select 'Set Autoshape Defaults'. This will make all subsequent text boxes – and other shapes – inherit the no-fill, no-line format. This default is stored in the document, so it will apply the next time you open the saved document.



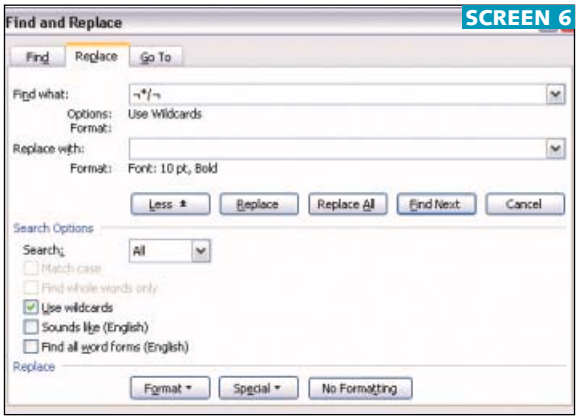
SCREEN 5

Yes, it's still a text box

...and more triangles

In October's column we showed a way of getting Word 2003 page numbers in triangular flashes – an option offered as ready-made in the Word 2007 beta. We used the expedient of placing a transparent text box over a coloured shape, but JL Goldberg has come up with a more elegant method. First create a text box and insert a page number, or any other text content you want. Then right-click format text box, to give it the fill colour and outline you desire. Now comes the clever bit. With the text box still selected, go to the Draw menu on the Drawing toolbar, and 'Change Autoshape' (see screen 5). Here you have access to all the Autoshapes – basic shapes, arrows, flowchart symbols, stars, banners and call-outs. Whatever shape you choose, it will still behave as a text box – the text will move with the shape and can be formatted and rotated like a regular box.

Selective formatting with Search & Replace



SCREEN 6

Search and rescue

Here's a neat challenge that arose at the Word conference on CIX (**www.cix.co.uk**). Someone was outputting database records into Word and wanted to have a particular field formatted with a different font size, and save the file in both Word and HTML. This wasn't possible from the database end, but he was able to output with special characters at the beginning and end of the field, that is, ¬myfield/¬. This, as well as providing a use for the mysterious ¬ key, made it easy to output to HTML in Word by using search and replace to change this to myfield. But how could he do this in a Word document?

Again Search and replace comes to the rescue. Open the Search and Replace dialogue (see screen 6), click the More button, tick 'Use Wildcards'. In the Search box type ¬*/¬. Click in the replace box – don't type anything, but click the Format button and specify the font size. Next, click 'Replace All'. Now make a new search for /¬, replacing it with nothing and no formatting. And finally search for ¬, replacing it with nothing and no formatting. Practice on a copy of the document first, then record a macro for re-use. **PCW**

Stephen Wells is a freelance journalist and a regular contributor to computer magazines. He's been writing PCW's Spreadsheets column for over 10 years.

→ Comments welcome on the Spreadsheets column.
Email spreadsheets@pcw.co.uk
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Excel doesn't have to be taxing

A simple calculation for three purposes: tax, discounts and commissions

It's not often that you find one solution for three unrelated queries, but that is the case this month. Kate Barber wants to know how to calculate the progressive discounts that her company offers to large companies. Carl Mazer asks for help in computing the varying levels of commission offered to his sales staff. And Robert Berson wants to use Excel to predict his tax on savings income.

Rather surprisingly the same template of formulas can be used to solve all three problems.

Robert says that, currently, tax on savings income is assessed in three bands: 10 per cent up to £2,150, 20 per cent between £2,151 and £33,300, and 40 per cent above £33,300. What would be the tax paid in each band on £34,000?

Logical calculations

Open a new workbook and start by entering what you know. Type in some descriptive labels (see screen 1). The upper limits of each band, £2,150 and £33,300, are entered into cells E3 and E4, respectively. Make sure that cell E2 is blank or there will be a problem with a cross-check to be entered later. The equivalent tax rates, 10 per cent, 20 per cent and 40 per cent, are entered in cells F2:F4. For the savings income, enter £34,000 in cell B1.

From here on the calculations are all very logical. You know that if the interest income (B1) is less than £2,150 (E3) then for Band 1 you can display all the interest income in cell B2. If the interest income is more than £2,150, as in this example, then Band 1 will be £2,150. You use the Excel IF function to do this. In cell B2 you can enter:

```
=IF(B1<=E3,B1,E3)
```

The next band will equal £31,150 (£33,300-£2,150). But you have to allow for the fact that the total interest

SCREEN 1

	A	B	C	D	E	F	G
1	Interest income	£34,000.00					
2	Band 1					10%	
3	Band 2				£ 2,150.00	20%	
4	Band 3				£33,300.00	40%	
5	Tax						
6							
7							
8							
9							

SCREEN 2

	A	B	C
1	Interest income	34000	
2	Band 1	=IF(B1<=E3,B1,E3)	=B2*F2
3	Band 2	=IF((B1-B2)<=(E4-E3),B1-B2,(E4-E3))	=B3*F3
4	Band 3	=IF(B3<=0,0,B1-B2-B3)	=B4*F4
5	Tax		=SUM(C2:C4)
6			
7			
8			

Top: Laying out the basics of the form

Bottom: Entering the only formulas you need

income may be more or less than £31,150, so in cell B3 enter:

```
=IF((B1-B2)<=(E4-E3),B1-B2,↙
(E4-E3))
```

(Key: ↙ code string continues)

Any more interest income than £33,300 puts you into the 40 per cent bracket, so in cell B4 enter:

```
=IF(B3<=0,0,B1-B2-B3)
```

Your entries in the range B2:B4 will now add up to the amount entered as interest income. All that is left is to calculate the tax on these entries. The first £2,150 is at 10 per cent, so in cell C2 enter, `=B2*F2` and drag this formula down to cell C4 which will read: `=B4*F4` (see screen 2).

Click on cell C5 and the AutoSum tool. Press Enter and you will see the tax to be paid for the amount entered as interest income in B1.

It is always wise to cross-check anything on a spreadsheet, so in cell C7 enter:

```
=IF($B$1<B2,$B$1*F2,B2*F2)
```

and drag this down to C9 which will read:

```
=IF($B$1<B4,$B$1*F4,B4*F4)
```

Sum C7:C9 in cell C10 and this total should equal that of cell C5.

A second check uses a totally different method implemented by accountants who only need a tax total and don't need to show the breakdown between bands. In G2 enter `=F2`, in G3 enter `=F3-F2`, and in G4 enter `=F4-F3`. What this does is show the differential in tax amounts between the bands. Now you can use the SUMPRODUCT function. It multiplies corresponding parts of two arrays and totals the results. In cell C12 enter:

```
=SUMPRODUCT(–(B1>$E$2:$E$4),↙
(B1-$E$2:$E$4), $G$2:$G$4)
```

I know it looks odd to show the first argument of the SUMPRODUCT function as a couple of hyphens, but that allows for the fact that the first band starts from nought. It only works, though, if there is nothing in cell E2. The results in cells C5, C10 and C12 should all be equal, no matter what the amount you enter in cell B1.

Assuming that the tax system on savings works as Robert says it does, the percentage of tax should gradually increase as the amount in cell B1 is increased. You can check this by entering `=C10/B1` in cell D10 and then by varying the interest income (see screen 3).

SCREEN 3

	A	B	C	D	E	F	G	H
1	Interest income	£ 34,000.00						
2	Band 1	£ 2,150.00	£ 215.00			10%	10%	
3	Band 2	£ 31,150.00	£ 6,230.00		£ 2,150.00	20%	10%	
4	Band 3	£ 700.00	£ 280.00		£33,300.00	40%	20%	
5	Tax		£ 6,725.00					
6								
7			£ 215.00					
8			£ 6,230.00					
9			£ 280.00					
10		Check 1	£ 6,725.00	19.78%				
11								
12		Check 2	£ 6,725.00					
13								
14								
15								
16								

The results with a couple of cross-checks

Don't be duped

Excel offers a number of ways for you to find and highlight duplicate names in a list. Here is one of the easiest to use. To save space, only a few names are shown in this example, but it works just as well with a thousand.

Highlight the list. Choose Conditional Formatting on the Format menu. Click the dropdown arrow in the first space of the displayed dialogue box and select Formula Is. In the right-hand box enter:

```
=COUNTIF($A$2:$A$20,A2)>1
```

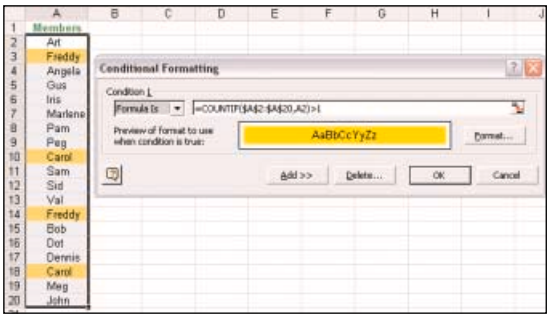
This assumes there is a label in cell A1 and there are 19 names. If the first name were in cell A1 and there were a thousand names it would be:

```
=COUNTIF↙
($A$1:$A$1000,A1)>1
```

(Key: ↙ code string continues)

The first argument of the COUNTIF function specifies the range with absolute references ($A$1) and the second uses a relative reference (A1).

Still in the Conditional Formatting dialogue box, click the Format button and choose the method of differentiating the appearance of the duplicates you wish to use.



Excel can automatically highlight duplicate data

In this example it's a cell background colour of yellow. Click two OK buttons and the duplicate names will stand out.

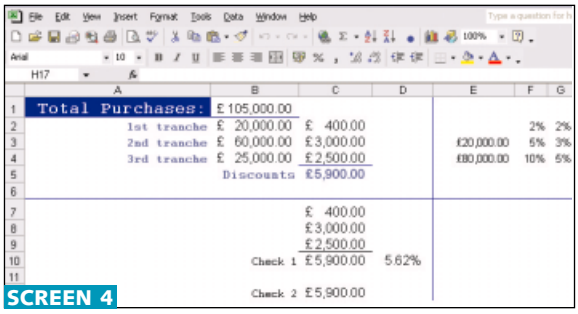
Discounts

Any manufacturing or distribution business gains efficiencies the more products a customer orders. If a customer's purchases total more than £100,000 in a year, then Kate's company offers a two per cent discount on the first £20,000 of orders, five per cent on the next tranche of orders, totalling £20,001 to £80,000, and 10 per cent on any purchases above that level.

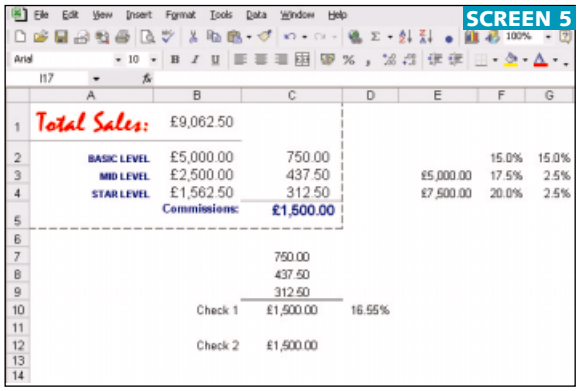
If you have worked out the example given for tax on savings income, all you have to do is change the labels and amounts. Any cell with a formula remains unchanged. Just enter £105,000 in cell B1, £20,000 in E3 and £80,000 in E4.

Enter two per cent, five per cent and 10 per cent in cells F2:F4. Make sure cell E2 is blank. As long as the same formulas are in the same cells it doesn't matter what the form looks like – so format as appropriate (see screen 4).

In this example, the customer purchases a total of £105,000 worth of products within a year and earns a £400 discount on the first £20,000, £3,000 on the next £60,000, £2,500 on the remaining £25,000 and, doubtless, Kate takes the client to lunch.



The same formulas used to show customer discounts



The same formulas used to calculate sales commissions

Rewarding the sales staff

Carl can use the same Excel template to calculate commissions for his sales people. His company pays a 15 per cent commission on a representative's first £5,000 worth of monthly sales. The next £2,500 earns a bonus of 2.5 per cent. Anything sold in the month above that earns another 2.5 per cent.

He can use exactly the same formulas that Robert and Kate used. All he has to do is change the labels and amounts. Cell E2 has to remain blank. Then £5,000 is entered in cell E3 and £7,500 in E4. If we assume that a rep made total sales of £9,062.50 in the month, their commission would total £1,500. Although the commissions sound generous, the result in cell D10 shows that this sales rep only costs the company 16.55 per cent of sales.

Again, if the same formulas as in the two previous examples are retained, the calculations will be correct although the form may look different (see screen 5). **PCW**

Take advantage of automation

It can save you a lot of time if you occasionally review the defaults under Excel's AutoCorrect, AutoFormat As You Type, and Smart Tags features. These are all found on the Tools menu under AutoCorrect Options.

Some people don't put full stops after abbreviations, but if you do, Excel may assume the full stop indicates the end of a sentence. If you type, 'Brown Inc. has increased profits', by default Excel will display that. But if you type 'The Brown Co. Ltd. has increased profits', then by default it will change 'has' to 'Has'. That's because Excel recognises that the US uses 'Inc.' for Incorporated but doesn't recognise that in the UK 'Ltd.' is the abbreviated form of Limited.

To fix that, click the Exceptions button in the AutoCorrect dialogue box and under the First Letter tab, in the Don't correct: box, enter, Ltd. and click the Add button.

Let's say for one particular job you find yourself frequently typing in Brighton, East Sussex and because of varying formatting, it's not practical to use Copy and Paste. Under the AutoCorrect tab you can enter 'brigh' in the Replace: box and 'Brighton, East Sussex' in the With: box. Now type, 'brigh' in a cell and press Enter.

If you type BBC, IBM or even DVD in a cell, a Smart Tag will appear. To avoid this remove the check against Label data with smart tags. Alternatively, choose None next to the option Show smart tags as.

Nigel Whitfield edited computer magazines before going freelance in 1995. A specialist in internet and consumer issues, he has a degree in Computing Science from Imperial College.

→ **Comments welcome on the Web development column. It returns in the March issue.** Email webdev@pcw.co.uk *Please do not send unsolicited file attachments.*

Get with the script

How scripting languages fit with your web server to help build dynamic sites

We've looked in the past at the PHP language, which is a great tool for building websites, especially those that are driven by a database. There are other options – one of which we'll come to later – but PHP has the ability to run on many platforms, is open source, and is directly supported in tools such as Dreamweaver, making it a simple solution for lots of people.

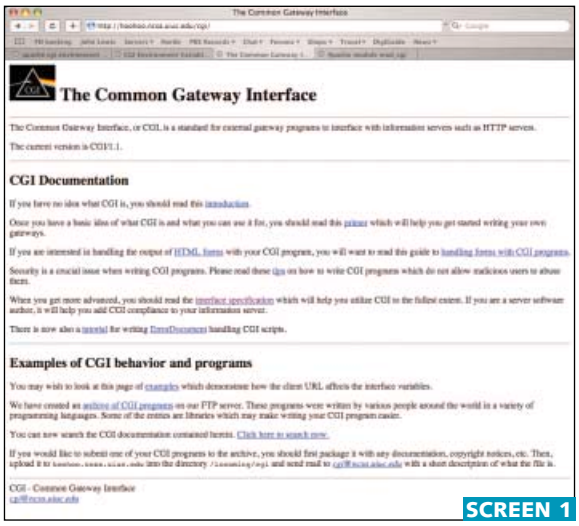
A few readers have asked for details of another language, Perl, which we've covered in the past, but not for a while. We'll give a basic primer in more detail later, and explain some of the things that it's particularly useful for. But one of the issues that often comes up is how to make scripts, whether in PHP, Perl or anything else, run on your web server.

So, this month I'll explain the basics of how scripts and applications actually run on a web server.

Common as muck

While Apache remains the web server of choice for most people, it wasn't the first one. Many of the early websites used a web server that came from the same source as the Mosaic browser – the NCSA; its original httpd program supported a means of calling external programs called the Common Gateway Interface, or CGI – hence, the .cgi extension on scripts that you'll see on some web servers, and the path /cgi-bin/.

The CGI specifies how information is passed to external programs, and how those can pass information back to the web server (see screen 1), which in turn passes it on to the web browser. There are various restrictions on how that can be done – a script can't send headers that might do things like redirect a browser to a different location, for example, if it has already sent something that doesn't look like a header. The script can, though, send more or less whatever it wants, such as an image, which is how counter scripts work.



SCREEN 1

The Common Gateway Interface is key to how scripts on web servers work

Apache supports the CGI specification for backwards compatibility with old scripts, as do most other web browsers, so creating a script or a program that works with CGI means it can be pretty portable.

Normally, when a browser requests a file, the web server checks the extension and makes sure that the file exists on the disk. If so, it uses the extension to set the appropriate Mime headers, telling a browser to expect a text file, HTML, an image, or whatever, and then a blank line is sent, followed by the file content.

However, there are a few tricks that the server can use to determine whether or not the file that's being requested is just a file, or a program that needs to be executed.

The one that's possibly most obvious to people is the path; traditionally this was called /cgi-bin/ and it's an alias that points to a particular place on the web server where scripts and other programs live. When the web server sees /cgi-bin/ in the URL that's requested, it knows firstly that it should look in a particular folder, and secondly that the items within that folder are likely to be executable programs or scripts, and they're treated accordingly.

So, for example, instead of finding the size and type of the file and sending that to the browser, the server executes the program and leaves it to the program to send Mime headers and other information back, based on the results of the request.

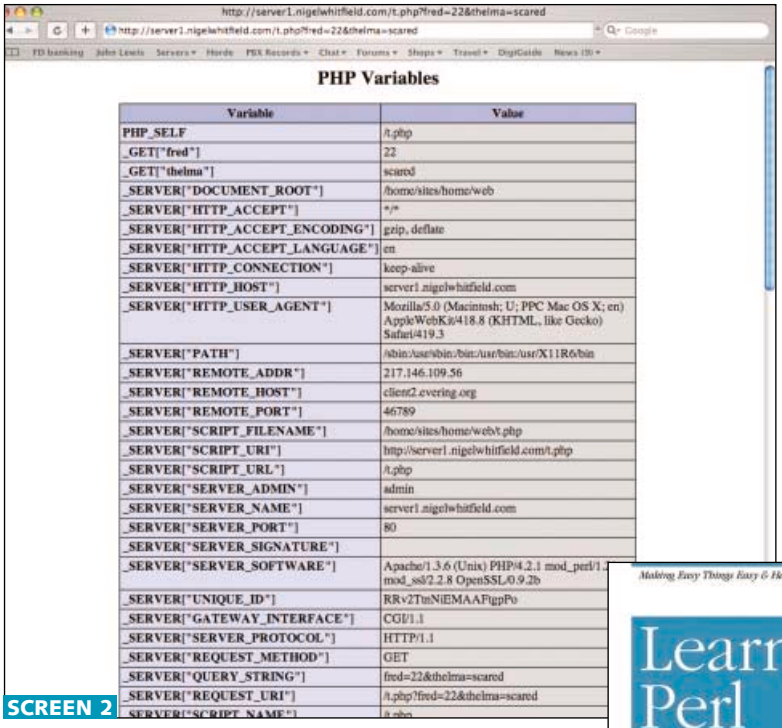
The same happens when the server has been configured to know that certain types of file are CGI programs, such as Perl scripts, via the extension .pl or other permitted extensions, such as .cgi.

When such a file is requested, the web server launches the script, usually via an interpreter such as the Perl executable, having first set up the CGI environment. And it's that environment that's the key to CGI and writing programs that use it.

Environmental awareness

The 'environment' in the CGI context means that there are particular pieces of information available to the script, which tell it how it was called and give some idea what might be expected of it. If you're a Linux or Unix user, you'll probably be familiar with the concept of environment variables; these control things like the PATH that's used to search for commands. Windows users have less truck with them, but they're still there; open a command window and type SET, for example, and you'll see the current environment for that command line.

The same is true for CGI; there are specific variables that are used to pass information to the script (see screen 2). If you've followed the PHP series in



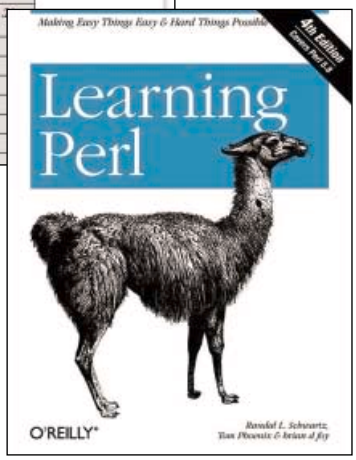
PHP Variables

Variable	Value
PHP_SELF	/t.php
_GET["fred"]	22
_GET["thelma"]	scared
_SERVER["DOCUMENT_ROOT"]	/home/sites/home/web
_SERVER["HTTP_ACCEPT"]	*/*
_SERVER["HTTP_ACCEPT_ENCODING"]	gzip, deflate
_SERVER["HTTP_ACCEPT_LANGUAGE"]	en
_SERVER["HTTP_CONNECTION"]	keep-alive
_SERVER["HTTP_HOST"]	server1.nigelwhitfield.com
_SERVER["HTTP_USER_AGENT"]	Mozilla/5.0 (Macintosh; U; PPC Mac OS X; en) AppleWebKit/418.8 (KHTML, like Gecko) Safari/419.3
_SERVER["PATH"]	/sbin:/usr/sbin:/bin:/usr/bin:/usr/X11R6/bin
_SERVER["REMOTE_ADDR"]	217.146.109.56
_SERVER["REMOTE_HOST"]	client2.evering.org
_SERVER["REMOTE_PORT"]	46789
_SERVER["SCRIPT_FILENAME"]	/home/sites/home/web/t.php
_SERVER["SCRIPT_URI"]	http://server1.nigelwhitfield.com/t.php
_SERVER["SCRIPT_URL"]	/t.php
_SERVER["SERVER_ADMIN"]	admin
_SERVER["SERVER_NAME"]	server1.nigelwhitfield.com
_SERVER["SERVER_PORT"]	80
_SERVER["SERVER_SIGNATURE"]	
_SERVER["SERVER_SOFTWARE"]	Apache/1.3.6 (Unix) PHP/4.2.1 mod_perl/1.. mod_ssl/2.2.8 OpenSSL/0.9.2b
_SERVER["UNIQUE_ID"]	RRv2TtsNiEMAAFtgpPo
_SERVER["GATEWAY_INTERFACE"]	CGI/1.1
_SERVER["SERVER_PROTOCOL"]	HTTP/1.1
_SERVER["REQUEST_METHOD"]	GET
_SERVER["QUERY_STRING"]	fred=22&thelma=scared
_SERVER["REQUEST_URI"]	/t.php?fred=22&thelma=scared
_SERVER["SCRIPT_NAME"]	/t.php

SCREEN 2

Left: In PHP, the _SERVER variables hold the CGI information

Below: O'Reilly's book isn't the cheapest Perl tutorial, but it's one of the best



this column, you will have seen references to some of them.

Perhaps one of the most important is called REQUEST_METHOD. This is usually either 'GET' or 'PUT'. The former indicates that the script was called via a standard URL, perhaps typed into a browser, so parameters may follow its name as part of the URL. The latter is usually found when the script is called as the result of a form being filled in. In this case, all the parameters are usually sent to the script's input and an additional piece of information, CONTENT_LENGTH, tells the script how much input to expect.

The QUERY_STRING makes up any parameters that are tacked on the end of a URL, following a question mark; in a URL like index.php?cat=2, it would be "cat=2" and so on. PATH_INFO is additional information that may follow the name of the script, but isn't a query; it's this that's often used on social sites to give easy-to-remember profiles, for example somesite.com/members.php/fred.

Other information includes the IP address of the browser requesting the page, the server name used, and the location of the script on the server's hard drive. The original spec is at **http://hoohoo.ncsa.uiuc.edu/cgi**.

How scripts work

So, when control is passed to your script, what happens next? There are a number of possible options. Things don't have to be done in a particular order – with some exceptions – but it's essentially something like this. First, if the script's only supposed to be called in one way, for example only by POST or only by GET, then it should check the REQUEST_METHOD variable to check that it has indeed been called correctly; and if not, then it probably needs to indicate the problem somehow in its output.

If it can be called in either way, then it still needs to check, as that will determine how any parameters are processed. For most scripts, there will probably be a number of options that can be set. If a script's been called via GET, then they're most likely in the QUERY_STRING, which takes the form of something like

```
option1=a&option2=b&x=y
```

The script then has to split that up, and set its own variables appropriately; when the information is POSTed, the effect is the same as if it were typed on the keyboard; in Linux/Unix terms, the information is fed to your script on 'standard input.' The CONTENT_LENGTH information explains how many characters of data can be read, and it's in the same format as the QUERY_STRING, so once again needs to be split up.

A well-written script also has to make sure that there's nothing in the information it's fed that could be used to cause mayhem – such as commands that could delete a database, or open up a back door somehow.

When your script has finished its work, it can start sending output; that's done by first sending headers, followed by a blank line and then – optionally, but usually there – the required content. That could be an image file, HTML, text or whatever – the headers allow you to specify the correct Mime type.

For example, a simple header could just say

```
Location: index.html
```

which would redirect the browser to the index page. Or you might output

```
Content-Type: text/html
<HTML><HEAD>
<TITLE>Test script…</TITLE>
</HEAD>
```

and so on. What you can't do is output information and then try to send the headers. If, for example, a connection to a database in a script fails, an error message may be sent from the database, and the web server will assume that plain text is being created by your script; it'll pass that on to the web browser, and then generate an error message if you subsequently try to send headers. So, for smooth operation, a good script needs to check for errors, rather than simply allowing system messages to pass through to the browser.

Next steps

Those are the basics of how scripts work on the web; there are variations, though. For example, if you're using PHP, then all the options to your script will be automatically split into individual variables. And for efficiency, web servers such as Apache can have popular script languages like Perl and PHP installed as modules so that the interpreter doesn't have to be launched for each script, easing the load on busy servers.

Next month, now that you know how the environment is set up for scripts, we'll start a tutorial on the basics of Perl, and explain how you can access the information you need from within your own scripts. If you want a head start, one of the best places to begin is the O'Reilly title *Learning Perl* by Randal L Schwartz et al (pictured above). **PCW**

Alan Stevens has implemented and supported networks for over 25 years, working for IT vendors, system integrators and customers. He now mostly researches and writes about networking matters.

→ Comments welcome on the Networks column.
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Build a virtual machine

Put Microsoft's free Virtual Server 2005 R2 through its paces

In last month's Networks column (see **www.pcw.co.uk/2166671**), I looked at the free VMWare Player and how it can be used with a virtual network-attached storage (Nas) appliance. However, you can't create virtual machines with VMWare Player, so in the next couple of issues I shall look at tools that allow you to do that, concentrating on virtual network servers and starting with Microsoft's Virtual Server 2005 R2 package.

It's free, don't you know?

The first thing to understand about Virtual Server 2005 R2 is that, although a major Windows server application, fully supported by Microsoft and recommended for production use, it's available completely free. OK, it'll cost in terms of download time and bandwidth usage, but otherwise there's no charge.

Another benefit is that you don't need a full-blown server to try it out, as Virtual Server 2005 can be hosted on a Windows XP PC, either 32-bit or 64-bit. However, the XP support is really only provided for testing and development work. For serious production use, Windows Server 2003 is the recommended host platform.

Lastly, although it's not possible to host Virtual Server on a Linux system, when Microsoft released the latest Virtual Server 2005 R2 package, it did make Linux an officially supported guest OS and released custom additions to help optimise Linux virtual machines (VMs).

Getting started

Virtual Server 2005 is available from **www.microsoft.com/downloads**. Note, however, that with the introduction of the free download, the Standard package was dropped, so the only choice now is the Enterprise version. You also need to ensure that you choose the right download for your hardware, as both 32-bit and 64-bit implementations are available. The 32-bit product will run on 64-bit processors but not vice versa.

You have to register to get the download but that's all, and at 28.4MB it's not a huge file. Installation is pretty easy too – just run the setup program and agree to the licence terms. You will, though, need to have IIS running on the host system, as management is all done via a browser. But that's not difficult, and the setup program takes care of firewall changes to allow remote access to the administration website it creates.

SCREEN 1

The amount of memory allocated to a virtual machine is specified when it's created, but can be changed again later

Building a virtual machine

Connect to the administration website and, after the authentication process, you'll be presented with a menu-driven interface through which you can both create and manage VMs.

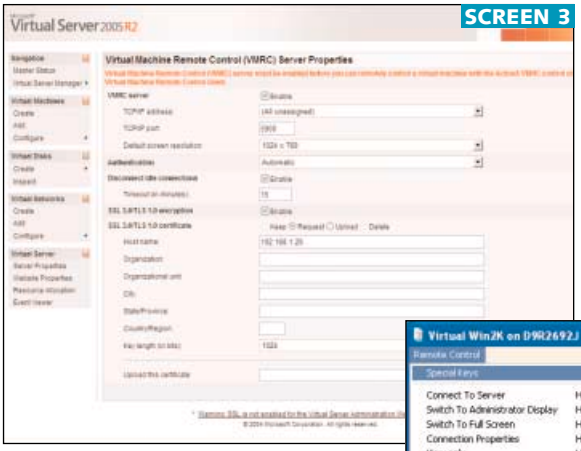
Click on Create on the left-hand side and you'll be asked for a VM name and an amount of memory to allocate to it (see screen 1). The figure you enter here will depend on a number of factors, including the amount of physical Ram in the host server, the guest OS and the number of other VMs that will be run simultaneously. Fortunately, the memory allocation can be changed later but beware of having to do so with XP virtual machines, as this kind of change can cause Windows to prompt for a licence re-activation.

You'll also be prompted to create a virtual hard disk – effectively a file on the host disk that will be used to contain the guest operating system, applications and data files. Create it here and, by default, you'll get a dynamically expanding disk. So, although you're asked for the size, that's treated as a maximum only and Virtual Server will allocate physical space on demand, as and when required by the guest OS.

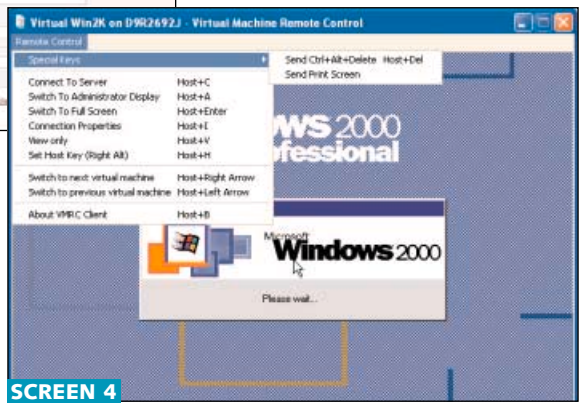
A fixed-size virtual disk can be created if you prefer, but you'll need to do that separately before building the virtual machine. There are a couple of more advanced options to build linked disks too, and you'll be given the option of emulating either an IDE or SCSI interface, which may not seem of great importance but some guest operating systems can be fussy when it comes to what you set. If in doubt, try IDE first, as SCSI support requires the SP1 update to Virtual Server 2005 R2, which was only available in beta format at the time of writing.

VMs can be powered up by clicking the thumbnail displayed on the status screen

SCREEN 2



You'll need to enable the Virtual Machine Remote Control (VMRC) server to get remote access to virtual machine consoles



The VMRC client utility can be used to connect to a virtual machine

Finally, you need to connect the virtual machine to the Lan. That usually means assigning the default virtual network adapter to a physical card in the host machine. The virtual machine will be assigned its own IP addresses on that adapter, effectively using the host connection as a bridge to the wider network. Alternatively, you can opt to connect the virtual network adapter to a private Lan, which will only allow it to connect to other VMs on the Virtual Server.

Having done that, click the Create button and Virtual Server will go away and build the new VM for you. However, there's still work to be done, as the end result is just like a brand new PC waiting to be switched on and have an operating system installed.

Turning on the display

Powering on a VM isn't difficult. Once it's created, you'll be presented with a status display like that in screen 2.

Click the thumbnail with a picture of a server on it and the virtual machine will be booted from the Bios up, which will list all the available VMs. However, you won't see anything happening unless you first turn on the Virtual Machine Remote Control (VMRC) server located on the host system. You also have to either run the VMRC client provided or load an associated ActiveX component into your browser.

The VMRC server is configured but not enabled when Virtual Server 2005 is first installed. As such, you'll be prompted to turn it on as soon as you open a console session on a virtual machine (see screen 3). Alternatively, you can do so by clicking on Server Properties in the Virtual Server menu and selecting the VMRC Server option.

The settings here are pretty straightforward. As well as enabling or disabling the server, you can limit remote control to a specific IP address and port combination and specify a default screen resolution for the remote control clients to use. You can also enable SSL encryption for when you want to manage a VM over an insecure connection.

Having enabled the VMRC server, you can then either run the custom client utility (vmrc.exe), which you'll find in a folder on the host server (see screen 4), or leave it to your browser to download and run the client ActiveX component (see screen 5). This will be done automatically when you click the thumbnail of a running VM on the administration website – assuming your browser settings allow ActiveX controls to be installed.

Whichever option you choose, clicking in the VM window will connect the mouse to the pointer on that display and pressing the right Alt key will release it back to the local PC. However, as with most remote-control solutions, Ctrl &Alt & Del won't be passed to the VM, so to log on to a Windows VM that requires Ctrl & Alt & Del to be sent, press the right Alt and Del keys together.

An ActiveX component allows virtual machine consoles to be accessed from a browser

You can use other remote-control software, such as VNC or Windows Remote Desktop to manage Virtual Server VMs, but not until the guest OS is up and running.

Loading the guests

It's then just a matter of installing the guest operating system. In the examples here, I've used Windows 2000 Workstation and Suse Open Linux 10.1, both of which I've installed by inserting the CD-Rom supplied into the Virtual Server host then booting the VM. Alternatively, it's possible to attach an ISO image of a CD-Rom to a VM, which is useful, for example, if you download a new Linux distro and don't want the hassle of burning a physical disc.

Once you've installed your guest OS, you'll want to set up what Microsoft calls Virtual Server Additions. These are drivers for the display, mouse, disk and other components, specially tuned for the virtual machine environment, with separate additions packages for use with Windows and Linux guests.

The Windows additions are included in the Virtual Server 2005 R2 download and are easily installed via the administration website. You'll be informed when the Additions aren't configured, with the option of installing them by clicking the link marked 'Click here to start Virtual Machine Additions setup'. This will mount them on a virtual CD-Rom and start the setup program. You just have to answer a few questions using the remote-control client and reboot.

Installing the Linux additions takes a little more work. First, you have to download the software from **www.connect.microsoft.com**, which may require registration if you're not already a member with a Microsoft passport. Next, you have to install the Additions on the Virtual Server host, before finally installing them onto your Linux VMs.

The Linux Additions are supplied in RPM format (install scripts are also included) and have been qualified for use only with Red Hat and Suse Linux distros. That doesn't mean they won't work with other distros, but there's no guarantee of compatibility – you have been warned. **PCW**

Mark Whitehorn is one of those lost souls who actually likes databases. He splits his time between consultancy, writing, working for two universities and tinkering with old cars.

→ Comments welcome on the Databases column.
Email database@pcw.co.uk
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It's a stitch up

Export text strings into an SQL-type database field; plus, why MVFs are a pain

SCREEN 1

TextImport : Table

PK	T1	T2	T3	T4	AllText
1	Fred is a	happy chaps who	likes fish and	chips.	
2	Sally is a	database programmer	and DBA.		
3	Looks like	we're in for	nasty	weather.	

Record: 4 of 4

Brian Ritchie has some data he wants to import into an SQL-type database, such as Access or Oracle. The data comes from an old mainframe system and started as a comment field. However, the only way Brian can export the data is as a series of text strings.

His question is whether it is possible to stitch these back together again into, say, a memo field in Access.

No problem. The first step is to import the table containing the text strings into a table in Access (see screen 1). This is in the sample database (DBCJAN07.MDB) as a table called TextImport. If you've bought the DVD edition of *PCW*, you'll find the database on the cover disc. It has four columns called T1, T2, T3 and T4. I've also added an empty fifth column called, not T5, but AllText.

Having set that up, we can now use an UPDATE query using GUI. First, open the query builder in design view and add the table TextImport. Pop down the Query menu option and choose Update Query. Select the field called AllText and then type the following into the Update To section:

```
[T1] & " " & [T2] & " " & [T3] ↙
& " " & [T4]
```

(Key: ↙ code string continues)

This says, essentially, add the contents of the T1 field to a space and then add the contents of the field called T2, then add a space, and so on and so forth.

This is saved as a query called FixText. When you run it you will see two warning messages; accept those and it will run and update the AllText column (see screen 2). The SQL is:

```
UPDATE TextImport SET ↙
TextImport.AllText = [T1] ↙
& " "& [T2] & " " & [T3] ↙
& " " & [T4];
```

This process of stringing values together is called concatenation and the & operator is, unsurprisingly, a concatenation operator. You can also use + as a concatenation operator, but it has an odd side effect. If any of the strings being concatenated is null or zero-length, then the entire string becomes null (see screen 3). You can see this effect by running the query called FixText2, which uses + instead of &. After running, the second row of the AllText field is blank because of the null value in T4.

This is not a bug as there are circumstances in which it is desirable to have the entire field as a null if even one component is null. The trick is, of course, to use the correct operator for the job in hand.

More on multi-valued fields

Data held in a relational database is supposed to be atomic, by which we mean that it has no internal structure. So, the value '23' is a piece of atomic data, as is 'Mark'. We use the various data types that the database engine offers (for example integer and text) to hold atomic data.

In the October issue I talked about the multi-valued fields (MVFs) that are appearing in Access 2007 (**www.pcw.co.uk/2163161**). Using one MVF field we can store, for example, 'gliding, swimming, computing' – all the hobbies of a single person. Most right-thinking people (by which I mean those who share my view of the world) would agree that this data is non-atomic.

The imported data before the queries are run

I suggested in that issue that MVFs, as implemented in Access 2007, were not a good idea. My advice was simple: don't use them. That produced a storm of protest from people, which didn't surprise me. What did completely boggle me was that all the protests came from people who don't use Access. The protesters were mainly users of non-relational database engines that use MVFs. They seemed to feel that I had, by attacking MVFs, attacked their favourite product.

So let me make my position perfectly clear. I have absolutely nothing against MVFs. An MVF is simply a data type. How can anyone love or hate a data type?

The problem isn't with MVFs, it's with MVFs and relational databases. As I said back in October, they are forbidden in relational databases by Codd's rule 2, the guaranteed access rule.

Each datum (atomic value) in a relational database is guaranteed to be logically accessible by resorting to a combination of table name, primary key value and column name. An MVF is just another data type; it is only in

the context of the relational model that they can be considered to be bad. Think about it this way. I like beer. I am emotionally neutral towards petrol. But putting petrol in my beer would change my opinion. Context is everything.

And if you are a believer in following rules, that's the end of the discussion. MVFs are forbidden. However, in truth, there is more to the argument than that, because it turns out that we can't really define atomic data at all easily.

Atomic data

The two people considered to be the most crucial in the development of the relational model are Ted Codd and Chris Date. Ted Codd is, sadly, no longer with us; Chris Date is still very much alive and writing. In a recent book, *Database in Depth* (ISBN 0-59610012-4, O'Reilly, 2005), he argues that for all practical purposes, the data types that we have always accepted as atomic (integers, text, dates) are not.

For example, the text string Mark can be decomposed into the separate characters that it contains. You could, of course, argue that 'Mark' is atomic because it represents one thing (in this case my first name) and only makes complete sense if left un-decomposed. But then think about dates like '21/03/2007'. This has a more complex internal structure than a text field because the month component is clearly different from the year component. We can extract the month part of the date and it still makes perfect sense.

Chris goes on to say that: "The real point I'm getting at here is that the notion of atomicity has no absolute meaning; it depends on what we want to do with the data."

If all of this sounds like heresy in the relational world, remember that Date is one of the guys who defined the relational model, so he is more qualified than most to pronounce on these matters. Second, if the relational model is to survive and prosper in the future, it will have to store and manage the more complex data types that are all around us – images, documents, XML etc.

XML is a case in point. It can have an arbitrarily complex internal structure and is clearly non-atomic.

'An MVF is a data type. How can anyone love or hate a data type?'

From humble beginnings it has flowered to become the ubiquitous standard for exchanging information. Relational database engines either adopt an XML data type or die. So pragmatism is most definitely the order of the day.

Function, function

Adopting data types with an internal structure means that the engine has to provide functions that can decompose, query and otherwise manipulate them. Once again, if this sounds like heresy, think how many functions you can name off the top of your head for manipulating the internal structure of those 'atomic' data types we already know and love – Date, DateDiff, Day, Hour, Chr, LCase, Left, InStr and so on.

So, we can easily argue that there is no real, fundamental objection to non-atomic data in the relational model at all.

Where does that leave MVFs?

Hang on a minute, Whitehorn! I've just looked back to the October issue. In that you argue that MVFs are utterly wicked. Now, three months later you are arguing that non-atomic data is fine. MVFs are non-atomic, so why have you changed your mind all of a sudden?

The truth is I haven't. I still believe that MVFs, as implemented in Access 2007, are a bad idea. The crucial difference between, say, MVFs and an XML datatype is simple. MVFs represent a solution to a problem that doesn't exist because it has already been solved.

The relational model is, without any extension, change or additional functions, quite capable of managing many-to-many relationships (many different people can have many different hobbies). We use joining tables. We don't need multi-valued fields. They add complexity to tasks rather than reduce it.

It is a bit like being offered a new product, a machine that will "lift your pint glass up from the bar and position it in front of your mouth at just the correct angle". Sounds wonderful. But I already have an arm to do just that.

In direct contrast, the addition of specific XML capabilities, data types, functions etc, does solve a problem; XML is new and we need elegant ways to handle it.

Microsoft argues that some people find joining tables fairly difficult to understand at first. There is no doubt in my mind that this is true in some cases. But, in my opinion, as implemented in Access 2007, MVFs also add their own problems and complexities. I think that on balance they provide the potential for more pain than gain. My advice is still very simple; don't use the multi-valued field in Access 2007. **PCW**

Top: After the first concatenation query has been run

Bottom: After the second. If the + operator finds a null value, the entire concatenation returns null

SCREEN 2

TextImport : Table

PK	T1	T2	T3	T4	AllText
1	Fred is a	happy chaps who	likes fish and	chips.	Fred is a happy chaps who likes fish and chips.
2	Sally is a	database programmer	and DBA.		Sally is a database programmer and DBA.
3	Looks like	we're in for	nasty	weather.	Looks like we're in for nasty weather.

Record: 4 of 4

SCREEN 3

TextImport : Table

PK	T1	T2	T3	T4	AllText
1	Fred is a	happy chaps who	likes fish and	chips.	Fred is a happy chaps who likes fish and chips.
2	Sally is a	database programmer	and DBA.		
3	Looks like	we're in for	nasty	weather.	Looks like we're in for nasty weather.

Record: 4 of 4

Tim Anderson is an IT journalist and software developer, and began writing for PCW in 1993. Since his first Commodore Pet, he has acquired expertise in Rad programming, Windows and the Internet.

→ Comments welcome on the Visual programming column.
Email visual@pcw.co.uk
Please do not send unsolicited file attachments.

How to code with Vista's WPF

Windows Presentation Foundation radically changes the way you design applications

Windows Vista sees the introduction of a new user interface framework called Windows Presentation Foundation (WPF) which is among the most radical changes to Windows since its first release. WPF is also available for Windows XP as part of .Net 3.0.

To succeed against Apple and Adobe, Microsoft has to attract designers as well as developers. In a traditional Windows application, the design aspect is hampered partly by the underlying widget set, which is hard to customise, and partly by the difficulty of having designers and developers work on the same project. Designers create graphics and mock up the user interface with specialist tools then pass them to the developer to implement.

The web is better in this respect, because the user interface in HTML and Javascript is separated from the application logic which runs on the server. WPF brings that separation to the Desktop. You can design a user interface in XAML, an XML language, and maintain the application code in code-behind files. This way of working is supported in Expression, the new range of Windows design tools. The same project can be opened in Expression Interactive Designer, for laying out the user interface, and in Visual Studio for writing the code. To see how this works, in this column I'll explain how to write a to-do list app in various languages.

Getting started

If you have Vista, .Net 3.0 is already installed. If you have XP, it is a free download. In order to develop for WPF you need the latest Windows SDK and the Orcas .Net Framework 3.0 development tools, which is an add-in for Visual Studio 2005. Where components are still in beta, you are recommended not to install them on a critical machine.

This early WPF application has impressed users with its clean, user-friendly UI

WPF allows you to write code with or without XAML. If you don't use XAML, WPF can be seen simply as an alternative to the Windows Forms library for .Net, or the Win32 API for native Windows GUI. You can also think of it as a wrapper for Win32, but that is debatable since WPF will be implemented on non-Windows systems in the form of WPF/Everywhere.

Many of the controls in WPF have the same names as those in Windows Forms. .Net knows which one you want by using namespaces. The System.Windows.Forms namespace has the old controls, while the new ones live elsewhere in System.Windows.

Now fire up Visual Studio and write a WPF to-do list. Start a new, empty Visual Basic project and add a new class called WPFToDo. Add at least the following WPF references:

```
PresentationCore
PresentationFramework
WindowsBase
```

Next, add the following imports at the top of WPFToDo.vb:

```
Imports System.Windows
Imports System.Windows.Controls
```

This will be a single-class application, so have the WPFToDo class inherit from Window. Then add the following Sub Main:

```
<STAThread()> _
Public Shared Sub main()
Dim app As Application = New ↙
Application
app.Run(New WPFToDo())
End Sub
```

(Key: ↙ code string continues)

You can run the app now and it will display an empty window. The next step is to add implementation code.

Layout in WPF

A key difference between WPF and older Windows GUI libraries is the way it handles layout. It is designed for auto-layout and, like the Java Swing library, relies on layout

FIG 1

Code for Sub New

```
Public Sub New()
Title = "PCW WPF To-do"
Me.Height = 400
Me.Width = 250
Dim sp As StackPanel = New StackPanel
lstTodo = New ListBox
lstTodo.Height = 200
sp.Children.Add(lstTodo)
txtItem = New TextBox
txtItem.Text = "Type new item here"
sp.Children.Add(txtItem)
Dim wp As WrapPanel = New  WrapPanel
btnAdd = New Button
btnAdd.Content = "Add"
wp.Children.Add(btnAdd)
btnRemove = New Button
btnRemove.Content = "Remove"
wp.Children.Add(btnRemove)
'add the WrapPanel to the StackPanel
sp.Children.Add(wp)
'add the content to the window
Me.Content = sp
End Sub
```

managers. Container controls, of which Window is one, have a content property that you set to an object of your choice. Add a button to the window:

```
Public Sub New()
Title = “PCW WPF To-do”
Me.Height = 350
Me.Width = 400
Me.Content = New Button
End Sub
```

The button will now fill the entire window. If that’s not what you want, instead of adding controls directly to the window, add them to a layout panel such as StackPanel, for top to bottom layout, WrapPanel, for left to right layout, or GridPanel, for a grid layout. Then add multiple controls to the Children collection of the panel.

We need a combination of StackPanel and GridPanel. Add the following controls as class members:

```
Dim WithEvents btnAdd As Button
Dim WithEvents btnRemove As ↙
Button
Dim WithEvents lstTodo As ↙
ListBox
Dim WithEvents txtItem As ↙
TextBox
```

Now complete Sub New (see figure 1).

The buttons are added to a WrapPanel, which is added to a StackPanel, achieving roughly what we need for a to-do list. If you run the application, you should see a listbox with a text control underneath, then two horizontally aligned buttons.

Now add the code to make the to-do list work (see figure 2). The application will now work, though if you have several identical items in the list, selecting one tends to select the others too. The workaround is to make sure each item is unique.

The layout needs some work. You could do this in VB code, but a better plan is to use the new XAML layout language.

Make the to-do list work

FIG 2

```
Public Sub AddItem(ByVal sender As Object, ByVal args ↙
As RoutedEventArgs) Handles btnAdd.Click
Me.lstTodo.Items.Add(Me.txtItem.Text)
End Sub
Public Sub RemoveItem(ByVal sender As Object, ByVal args ↙
As RoutedEventArgs) Handles btnRemove.Click
  If Me.lstTodo.SelectedIndex > -1 Then
Me.lstTodo.Items.RemoveAt(Me.lstTodo.SelectedIndex)
  End If
End Sub
```

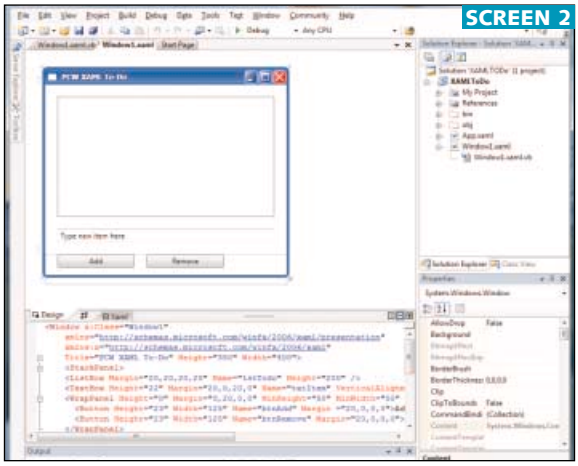
(Key: ↙ code string continues)

An add-on to Visual Studio gives a two-way visual/code XAML designer

To-do list in XAML

To start a new XAML project in Visual Studio, choose Windows Application (WPF) in the New Project wizard. The visual designer is a little rough-and-ready in the current preview, but you can easily flip to XAML code. See figure 3 for the to-do list in XAML.

SCREEN 2



This XML is easy to follow but where is the event handling code? Visual Studio creates a code-behind file, though it may be hidden. Click ‘Show all files’ in the Solution explorer and edit Window1.xaml.vb. You can use the same code for the event handlers as used in the non-XAML version. Visual Studio compiles the XAML and code into a single executable that is effectively identical to the code-only version, except that some margins have been added.

XAML apps can also be browser apps. Use a Page class instead of a Window class as the root element, and compile the application into an XBAP (XAML Browser Application). This runs in a sandbox and does not support unsafe features of .Net.

XAML provides the designer-friendly separation between code and mark-up. And XML is just a good language for laying out a GUI, especially if you are familiar with HTML. XAML is also a neat way to deliver apps via a web browser, provided users have WPF installed.

It is important to distinguish between the XAML language and the WPF framework. With WPF, Microsoft has reshaped the Windows API with a focus on custom design and advanced graphical effects. XAML is a convenient way to code for WPF. The idea is that plain old business apps remain with Windows Forms, which is mature and has a stronger set of business-oriented controls, while WPF targets apps that are more visual and design-oriented.

It will be a while before the WPF runtime is widely deployed; and the industry is sceptical about cross-platform implementation. Even so, it is a major change for Windows and well worth exploring. **PCW**

A to-do list in XAML

FIG 3

```
<Window x:Class=”Window1”
xmlns=”http://schemas.microsoft.com/winfx/2006/xaml/presentation”
xmlns:x=”http://schemas.microsoft.com/winfx/2006/xaml”
Title=”PCW XAML To-Do” Height=”350” Width=”400” >
<StackPanel>
<ListBox Margin=”20,20,20,20” Name=”lstTodo” Height=”200” />
<TextBox Height=”22” Margin=”20,0,20,0” Name=”txtItem” VerticalAlignment=↙
”Bottom”>Type new item here</TextBox>
<WrapPanel Height=”0” Margin=”0,20,0,0” MinHeight=”50” MinWidth=”50” ↙
Name=”WrapPanel1” VerticalAlignment=”Bottom” >
<Button Height=”23” Width=”125” Name=”btnAdd” Margin =”20,0,0,0”>↙
Add</Button>
<Button Height=”23” Width=”125” Name=”btnRemove” Margin=”20,0,0,0”>↙
Remove</Button>
</WrapPanel>
</StackPanel>
</Window>
```

(Key: ↙ code string continues)

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Selfridges - Trafford Centre, Manchester, upper level technology hall.
Selfridges - Exchange Sq, City Centre Manchester - Lower ground floor.
Selfridges - Bullring Birmingham, Level 1 in the technology hall.

Device compatibility

Blackberry, Nokia N series and 6600 models,Fujitsu Siemens LOOX 420, LOOX 720, T- Mobile MDA compact, MDA II, MDA III, Vodafone VPA II, VPA III, VPA compact, O2 Xda II, Xda III, Qtek 2020, HP iPAQ hx2110, iPAQ hx2410, iPAQ rx3715, iPAQ hx2750, iPAQ hx4700, iPAQ hx5150, iPAQ hx6340, Acer n30, Acer n50, Dell Axim X50, X30, Palm Zire 72 - silver, Tungsten T2, Tungsten T3, Tungsten T5, Treo 650, LifeDrive.
Please contact us direct if your model isn't shown new devices added regularly.

Operating System

Palm OS 5.2.1, 5.2.8, 5.4.5, Windows Mobile 2003 4.20.1081 (Build 13100), 4.20.0 (Build 14053), 4.21.1088 (Build 14235.2.0.0), Windows Mobile 2003 SE 4.21.1088 (Build 14132), Windows 2000/XP, Symbian and RIM

Bluetooth™

How to buy the best products tested by our Labs

This Buyer's Guide is a comprehensive listing of the best products PCW has tested across a range of areas, helping you to make the best decision when you're planning a purchase. Over the following pages you'll find products, their verdicts and ratings, plus information on where you can read the full review.

BUYER'S GUIDE

78 PRODUCTS REVIEWED TO MAKE YOUR BUYING DECISION EASIER

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Digital cameras
Routers
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Prices are for guide purposes only and may be subject to change

HOW TO BUY: PCs

Many of the choices you are faced with when buying a PC are covered in the following pages. You need to think about the graphics card, memory, onboard sound or separate soundcard, size and type of hard disk, CD burner or DVD burner and so on.

Once your budget is set, the starting point is the CPU (central processing unit), because it is the brains of your PC.

Intel and AMD offer a bewildering number of processors. The differences between the CPUs are in technical details that don't necessarily mean much to end users. Pricing is also competitive, with AMD PCs generally cheaper than comparable Intel models.

Budget PCs come with Intel's Celeron or AMD's Sempron CPUs. These are aimed at undemanding users. If your needs are for word processing tasks and surfing the internet with some low-end gaming or image editing, a PC running either of these processors is fine. You won't need a huge hard disk – 80GB will be plenty – coupled with between 256MB and 512MB of Ram and a low-end graphics card, or even onboard graphics for the truly undemanding. You'll be fine with onboard sound, and can expect to pay up to about £500, depending on your monitor.

In the mainstream desktop market it's Pentium 4 and Pentium D versus AMD's Athlon XP and Athlon 64. The chief difference is that older Pentium 4 and Athlon XP models are 32bit CPUs, while some newer Pentium 4s, the Pentium D and Athlon 64 are 64-bit models. To take full advantage of this, you need a 64-bit operating system and applications.

More memory can be supported by 64-bit systems – 32-bit Windows or Linux systems are limited to 4GB of Ram, whereas a 64-bit Windows or Linux system can support 128GB. Data is also moved in larger chunks, allowing a theoretical speed advantage.

AMD and Intel offer high-end processors with the Pentium Extreme Edition and Athlon FX ranges, both aimed at the hardcore gaming market. They also have dual-core CPUs. These processors, in effect, act as two CPUs in one and offer superior performance.

If you're choosing a PC running the above CPUs, other considerations come down to your needs. If you store lots of music, video or photos, go for a big hard disk – 200GB or above. Memory will help speed up applications, so aim for 1GB or above and don't drop below 512MB. The latest games demand the latest graphics cards, but for most people, cards that were new six to 12 months ago will be powerful enough. And look at the CPU's cache memory, which helps eliminate data bottlenecks.

Most PCs are Windows XP, and the Home Edition is fine. If it's for a small business, or you need features such as remote access, buy XP Professional. Few PCs are sold running Linux, and we recommend that only the technically confident buy a Linux-only system. Linux can always be installed later. Finally, don't overlook the monitor, especially if you're using the PC for gaming or imaging. Buy the best you can afford.

1

Higrade Ultis Tachyon QX6700
£2,178 ★★★★☆
Reviewed January 07
www.higrade.com
Quad core makes its debut with this powerful PC from Higrade.

2

Mesh Elite E6600 Express
£1,049 ★★★★☆
Reviewed January 07
www.meshcomputers.com
A good-value Core 2 Duo PC with a free upgrade to Windows Vista.

3

Apple iMac 24in
£1,349 ★★★★☆
Reviewed December 06
www.apple.com/uk
An impressively designed system that is equally suitable for home entertainment and professional use.

GRAPHICS CARDS

SUB £200

1

Gainward Bliss 6800GS GLH
£176.19 ★★★★★
Reviewed July 06
www.overclockers.co.uk
A terrific graphics card for those who like to dabble with overclocking.

2

3D Fuzion Geforce 7600GS
£75.20 ★★★★☆
Reviewed November 06
www.novatech.co.uk
A good value card for those on a tight budget.

3

Sapphire Radeon X1600 XT Ultimate
£110 ★★★★☆
Reviewed September 06
www.sapphiretech.com
Not totally fan free, but still one of the quietest cards around, and performs well.

£200–£349

1

Gecube Radeon X850XT Uniwise
£269.97 ★★★★★
Reviewed May 05
www.gecube.com
A single-slot design using Gecube's own cooling system, and it offers good performance.

2

Gainward Bliss 7800GT GLH
£244.89 ★★★★☆
Reviewed July 06
www.overclockers.co.uk
A little expensive, but this card has plenty of overclocking potential.

3

Powercolor Radeon X850XT Platinum Edition
£320 ★★★★★
Reviewed July 05
www.powercolor.com
Based on ATI's fastest Radeon processor, this card will run the latest games with ease.

4

Gecube X850XT Platinum Edition Uniwise
£307 ★★★★☆
Reviewed January 06
www.gecube.com
High-end performance and quiet cooling for AGP motherboards.

£350+

1

MSI NX7950GX2
£408.85 ★★★★☆
Reviewed September 06
www.msicomputer.com
A dual-core card that paves the way for DIY quad-SLI.

2

HIS Radeon X850XT Platinum Edition IceQII
£370 ★★★★★
Reviewed June 05
www.hisdigital.com
Making use of the IceQII efficient cooling system, this is a quiet and super-fast card.

3

Sapphire Toxic X1900XTX 512MB
£421.83 ★★★★☆
Reviewed August 06
www.sapphiretech.com
This is a water-cooled, overclocked and blazingly fast graphics card.

HOW TO BUY

Most graphics cards are based on either the Nvidia Geforce or ATI Radeon family of chips. Each has their strengths and both offer state-of-the-art image acceleration and comparable features.

Performance improves as you move up a range. Top chips offer more features and draw more pixels or textures in a single pass than cut-down, lower-cost options. All current graphics processors are fine for office work, but hardcore gamers favour Nvidia's Geforce 6800 or new 7800 series and ATI's latest X1900 XTX card.

Ensure the card you buy can display favoured resolutions with at least a 75Hz monitor refresh rate to avoid eye strain from flicker (if using a CRT monitor).

There are usually three clock speeds quoted (in megahertz). Core clock is the internal speed of the graphics processor. Memory speed (or memory clock) is the speed of data transfer between the graphics card's onboard memory and the graphics processor. Ramdac speed is the capability of the digital-to-analogue converter that provides the graphics output from the card.

Graphics cards use their own dedicated video memory to store data, images and textures. The more you have, the better the performance. A card with 64MB is fine for office tasks, but we recommend at least 128MB or 256MB for the latest games and video applications.

About £40 will buy you a Geforce FX 5200 or Radeon 9200 card with 128MB of Ram, which is good for 2D action/strategy games, image editing and less demanding 3D games.

To play 3D action games smoothly, look at £100–£150 cards. Serious gamers should consider the Geforce FX 6800 GT at £280-plus, Radeon 850 XT at £320-plus, or 7800 GTX at £350-plus.

Depending on the motherboard, you'll need an AGP or PCI Express graphics card. PCI Express is the newest interface standard, offering up to double the bandwidth of an AGP 8-speed slot for even faster and more complex graphics. Both ATI and Nvidia offer PCI Express versions of most of their cards. Nvidia also has its SLI (Scalable Link Interface) technology that lets you use two PCI Express graphics cards in SLI-enabled motherboards for ultimate performance. ATI's rival technology Crossfire is an alternative.

Look for support for both analogue (VGA) and digital (DVI) displays, and S-video and composite video outputs for use with TVs. Some 'all-in-one' cards have a built-in TV tuner and video-capture options, so you can save money rather than buying separate cards.

NOTEBOOKS

1

Hi-Grade D6000_1602
£997.58 ★★★★☆
Reviewed December 2006
www.higrade.com
Intel's Core 2 Duo processor powers this portable and great-value media center notebook.

2

Dell Latitude D420
£1,350 ★★★★☆
Reviewed December 2006
www.dell.co.uk
A good business notebook, complete with an HSDPA high-speed internet module.

3

Evesham Voyager C720DC
£1,499 ★★★★☆
Reviewed November 06
www.evesham.com
A super-fast notebook with Intel's new mobile Core 2 Duo processor.

4

Evesham Quest Nemesis
£1,599 ★★★★☆
Reviewed September 06
www.evesham.co.uk
A great notebook for 3D gaming, but battery life isn't exceptional.

5

Acer Aspire 5652
£1,149 ★★★★☆
Reviewed November 06
www.acer.co.uk
A fast notebook with high-speed mobile internet.

HOW TO BUY

Notebooks have caught on like wildfire with consumers thanks to plummeting prices and massive marketing campaigns. However, there are so many options that it's easy to get confused.

Decide what you want your notebook for. If it's for occasional use, running some office applications, accessing the internet and email, then almost any low-cost notebook will do the job. If it's for gaming or running video-editing software, you will be looking for a notebook with a large 15in/17in screen – possibly widescreen – a high-end Nvidia or ATI graphics chip, 1GB of memory and an 80GB (or bigger) hard disk.

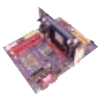
In the low-cost arena, Intel has its Mobile Celeron chip and AMD has Sempron. In the mid-range/high-end space, there are Intel's Mobile Pentium 4 or Pentium 4 chips, while AMD offers Mobile Athlon 64 and Athlon 64. Expect to find these in desktop replacement systems and those used by gamers.

For the best in performance with power-saving technology, go for Intel's Core Duo or AMD's Turion 64 processors.

Any notebook you get should have in-built Bluetooth and Wifi connectivity, a 30–40GB hard disk drive, 512MB of Ram, 14–15in screen, USB2 or Firewire ports, DVD/CD-RW combo drive and three to four hours' battery life.

MOTHERBOARDS

SUB £100

1 

ECS PF88
£64.63 ★★★★☆
Reviewed August 05
www.ecs.com.tw
The PF88 is feature-packed and compatible with both Intel and AMD processors.

2

Aopen i915GMm-HFS
£79 ★★★★☆
Reviewed July 05
www.aopen.com
The HFS makes the ideal platform for building a quiet, power-efficient Intel PC.

3

Asus A8N-SLI Deluxe
£98 ★★★★☆
Reviewed April 05
www.asus.com
A good, all-round AMD SLI board, packed with plenty of features.

4

ECS 915-A
£61.81 ★★★★☆
Reviewed June 05
www.ecs.com.tw
All the features you'd expect from a modern Intel-based motherboard and outstanding value for money.

5

ECS RS485M-M
£43.06 ★★★★☆
Reviewed January 07
www.ecs.com.tw
Good budget motherboard for PC builders with home theatre in mind.

6

Epox 8HDA3+
£79.92 ★★★☆☆
Reviewed July 04
www.epox.com
An AMD board that stands out from the crowd thanks to its dual Lan and external Sata support.

7

MSI 945P Platinum
£99 ★★★☆☆
Reviewed November 05
www.msi.com.tw
An Intel board that features DTS Connect, so you can output true DTS surround-sound audio.

£100+

1

Gigabyte GA-965P-DQ6
£164.44 ★★★★☆
Reviewed October 06
www.giga-byte.com
A decent Core 2 Duo motherboard that's loaded with overclocking features.

2

Asus M2N32-SLI Deluxe Wireless Edition
£136.59 ★★★★☆
Reviewed www.pcw.co.uk/2156925
www.asus.com.tw
This is one of the new motherboards to support the AMD AM2 socket.

3

Aopen i945GTm-VHL
£188 ★★★★☆
Reviewed January 07
www.aopen.com
A well-featured motherboard, but it's an expensive option.

HOW TO BUY

The motherboard dictates the type of processor you can use, how well the components communicate, the features on offer and future upgrade potential. About £70–£100 gets you the latest technologies.

We recommend an Intel P4 or Athlon 64 for a good all-round system. The Athlon 64 can address one terabyte of Ram (1,000GB).

The new generation of processors change the way data is transferred. Athlon 64s integrate the memory controller into the CPU die.

Divided into northbridge and southbridge, the chipset handles the communication between all the components and dictates the features on offer.

Today's motherboards mainly use DDR or DDR2 Ram.

Fit dual in-line memory modules (Dimms) in pairs if the chipset supports dual-channel operation.

The latest boards support both older IDE and new, faster serial ATA (Sata) hard disks. Check the number of connectors available for both.

Some chipsets provide Raid support so data can be spread across two drives. SCSI controllers are found on more expensive boards, or can be added with expansion cards.

Also important is the number of USB2 and Firewire sockets for external add-ons. Look out, too, for onboard Ethernet networking, a built-in 56K modem and onboard sound.

DIGITAL MUSIC PLAYERS

1

Apple iPod Shuffle
£55 ★★★★★
Reviewed December 2006
www.apple.com/uk
The mini-marvel from Apple gets even smaller.

2

Sandisk Sansa e260
£149 ★★★★★
Reviewed September 06
www.sandisk.co.uk
User-friendly and feature-rich, this mp3 player is capable of being a Nano-killer.

3

Netac A200
£69.99 ★★★★★
Reviewed www.pcw.co.uk/2162508
www.netac.co.uk
Broadcast your tunes directly to an FM radio with this compact portable media player.

4

Apple Ipod
£219 ★★★★★
Reviewed January 06
www.apple.com/uk
All the usual Ipod features but now with the ability to play video.

5

Creative Zen Nano Plus
£99 ★★★★★
Reviewed December 05
http://europe.creative.com
1GB flash player that houses a radio, voice recorder and mp3 encoding from a line-in source.

HOW TO BUY

There are two main categories of mp3 players: Flash memory-based players, which range in size from 256MB to 1GB; and mini hard drive-based models, which run from 4GB to 60GB. Prices for a 256MB player start as low as £20 rising to around £300 for a 60GB player. In terms of songs, the difference is the ability to hold 40 on one and 15,000 on the other.

If you need a portable record store, then go for a 4GB–6GB player – up to the range of 20GB, 40GB and 60GB models. Ensure whatever you buy supports playback in different formats. The ability to listen to FM radio and record voice is also a bonus. Most importantly, check out the battery life.

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YOYO Code: 4409
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Centurion 534 ATX Mid Case
COOLER MASTER
Mft Code: RC-534-SKN1-GP
YOYO Code: 4707
£37.07 INC VAT

Nvidia Socket AM2 ATX Motherboard
Mft Code: KN9S
YOYO Code: 5147
£59.06 INC VAT

Socket 775 PCI-E SATA Motherboard
Mft Code: IL8
YOYO Code: 4471
£59.72 INC VAT

USB2.0 + 80X 1GB OCZSDDU80-1GB
SD Dual Digital Card
£24.97 INC VAT
YoYo Code: 4845

250GB SATA 2 7200RPM HDD
HITACHI
Mft Code: HDT722525DLA
YOYO Code: 2311
£52.71 INC VAT

160GB SATA 2 8MB 7200RPM HDD
Seagate
Mft Code: ST3160812AS
YOYO Code: 4074
£42.58 INC VAT

Core 2 Duo E6300 Socket 775 CPU
intel
Mft Code: BX805576300
YOYO Code: 8031
£131.45 INC VAT

AM2 Athlon 64 3800 Orleans CPU
AMD
Mft Code: ADA3800CNBOX
YOYO Code: 4477
£77.44 INC VAT

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7300GT Silent DVI PCI-E Graphics Card
Mft Code: EN7300GT SILENT/HTD/256
YOYO Code: 8067
£61.94 INC VAT

Radeon X1600 AGP DVI Graphics Card
Mft Code: 11076-02-20
YOYO Code: 4772
£90.80 INC VAT

VS 1GB PC2-4200 DDR2 533 Memory
Mft Code: VS1GB533D2
YOYO Code: 9410
£75.91 INC VAT

512MB DDR2 667 (PC5400) Memory
Mft Code: OCZ2667512V
YOYO Code: 5299
£40.84 INC VAT

V L System M-PLAY Mini VFD Display+Remote
£14.39 INC VAT
YoYo Code: 4167

550W P4 Super Silent Power supply
Mft Code: n4ce550W
YOYO Code: 9841
£16.10 INC VAT

520W Powersupply with 120mm Fan
Mft Code: OCZ52012U
YOYO Code: 4359
£53.91 INC VAT

Aero Flower Cooper Cooler
Mft Code: CNPS9500 LED
YOYO Code: 2251
£32.05 INC VAT

Freezer 64 Pro CPU Cooler
Mft Code: Freezer 64 Pro
YOYO Code: 4039
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London W1T 2JL

HARD DRIVES

INTERNAL

1

Seagate Barracuda ST3750640AS
£352.44 ★★★★☆
Reviewed August 06
www.seagate.com
An internal hard drive that provides you with a whopping 750GB capacity.

2

Western Digital Raptor X
£243.17 ★★★★☆
Reviewed June 06
www.wdc.com
Two 75GB platters combine to create one of the fastest non-SCSI hard drives.

3

Seagate Barracuda 7200.8 (ST3400832A) 400GB
£186.96 ★★★★☆
Reviewed July 05
www.seagate.com
This massive 400GB drive offers impressive capacity and an 8ms seek time.

4

Hitachi Deskstar 7K250 (250GB Sata150)
£88 ★★★★★
Reviewed May 04
www.hitachi.co.uk
Those needing a large Sata150 drive will find this a great bargain.

5

Samsung Spinpoint P120S
£80.11 ★★★★☆
Reviewed February 06
www.samsung.co.uk
This isn't the fastest drive on the market, but it is extremely cool and quiet.

EXTERNAL

1

Maxtor Onetouch II Firewire 800 300GB
£179 ★★★★★
Reviewed November 05
www.maxtor.com
A good-quality 300GB USB and Firewire hard drive that comes with backup software.

2

Western Digital My Book Essential Edition
£149 ★★★★☆
Reviewed June 06
www.wdc.com
This is a stylish external hard disk drive, but it lacks a network option.

3

Lacie Safe Mobile Hard Drive 80GB
£149 ★★★☆☆
Reviewed December 05
www.lacie.co.uk
Featuring a fingerprint reader for security, this 80GB external hard drive would suit business users.

4

Buffalo Linkstation 120GB
£240 ★★★★☆
Reviewed October 04
www.buffalotech.com
If you want easy-to-use external network storage, this is a great choice.

5

Buffalo Ministation HD-PHS40U2/UC
£70 ★★★★☆
Reviewed April 06
www.buffalo-technology.com
This 40GB portable hard drive includes shock protection to minimise the risk of data loss.

HOW TO BUY

If you're building a high-performance system, buy the fastest drive you can afford; if you just want lots of capacity then slower drives offer better value.

The transfer rates in today's Ultra ATA drives are 100Mbytes/sec (133Mbytes/sec for Maxtor drives), while serial ATA (Sata) drives are rated at 150Mbytes/sec. Check the seek times, spindle speed, buffer size and the areal density of the platters (disks).

The larger the buffer (cache), the more recently written or stored data is held in the drive's memory, resulting in less time seeking the data on the disk.

Areal density is the amount of data stored on a given area of a drive's platter. The more data per square centimetre (gigabytes per platter), the less disk movement is required to bring it under the heads.

Faster Sata drives are more expensive than parallel ATA. Sata uses two pairs of high-frequency cables, working at low voltage.

SCSI drives are technically no different to ATA drives, but support up to 16 devices on a single channel and you can have multiple channels in a PC.

Most motherboards support Raid (Redundant Array of Independent Disks), which connects multiple drives, to improve performance or provide fault tolerance.

DVD DRIVES

1

NEC ND-4551A
£35 ★★★★★
Reviewed May 06
www.nec.co.uk
An excellent DVD drive supporting every format and Labelflash technology.

2

Pioneer DVR-110 Supermulti
£40 ★★★★★
Reviewed March 06
www.pioneer.co.uk
Supports all major formats, including DVD-Ram. Good value for money.

3

Toshiba SD-R6472
£83.42 ★★★★☆
Reviewed September 05
www.span.com
A slimline dual-layer DVD writer that performs well and is perfect for small form factor PCs.

4

Philips DVDR16LSK
£59.99 ★★★★☆
Reviewed October 05
www.philips.co.uk
An excellent Lightscribe-capable dual-layer DVD burner that's very keenly priced.

5

LG 12X Super Multi DVD
£116.99 ★★★★☆
Reviewed January 05
www.lge.co.uk
Good-value external USB2/Firewire rewriter with all-format media support.

HOW TO BUY

DVD burners can be divided into internal and external drives. Internal drives are cheaper, but require a level of knowledge so you can install them yourself. External drives can be hooked up simply via USB2 or Firewire.

Make sure your drive supports DVD+R, DVD+RW, DVD-R and DVD-RW discs. Newer double and dual-layer drives can write to new discs which can store 8.5GB. This is useful for backing up your DVD movie collection.

The dual-layer drives cost little more than single-layer drives, so are a good investment. The same cannot be said for the cost of dual-layer discs. A branded, dual-layer 8.5GB disc will cost around £3.75.

PRINTERS

PHOTO PRINTERS

1

HP Photosmart D7360
£199.99 ★★★★★
Reviewed January 07
www.hp.com/uk
An excellent printer that's worth every penny.

2

Canon Pixma IP6700D
£149 ★★★★☆
Reviewed January 07
www.canon.co.uk
A very competent printer with the bonus of an auto-duplex feature.

3

Canon Selphy CP730
£170 ★★★★☆
Reviewed January 07
www.canon.co.uk
A simple-to-use dye-sublimation printer that produces good photos.

4

Epson Stylus Photo R360
£149.99 ★★★☆☆
Reviewed January 07
www.epson.co.uk
A good choice if you want to use an LCD control panel, with great-quality prints.

MULTIFUNCTION DEVICES

1

Canon Pixma MP800R
£329 ★★★★★
Reviewed July 06
www.canon.co.uk
A capable MFD with built-in wireless networking that's easy to set up and use.

2

Dell Photo All In One 944
£121 ★★★☆☆
Reviewed April 06
www.dell.co.uk
A bulky, but good-quality MFD that would suit both home and small office use.

LASER PRINTERS

1

HP Color Laserjet 2605dn
£299 ★★★★★
Reviewed September 06
www.hp.com/uk
An affordable colour laser that would benefit any small business.

2

Lexmark C500n
£239 ★★★★☆
Reviewed September 06
www.lexmark.co.uk
A good budget colour laser, but it comes with low starter cartridges.

3

Brother MFC-8860DN
£527.58 ★★★★☆
Reviewed November 06
www.brother.co.uk
Fax, copy, print and colour scanning combined in a laser multifunction device.

4

OKI C3300n
£374 ★★★☆☆
Reviewed www.pcw.co.uk/2162830
www.oki.co.uk
A fast alternative to a laser printer for small workgroups and home users.

HOW TO BUY

If you don't need colour, consider a monchrome laser or LED printer. The latter tend to be cheaper.

If you print hundreds of pages a week, a laser is cheaper and more reliable for high-volume printing. If you print a few pages a month, buy a cheap colour inkjet.

Look for the manufacturer's quoted 'duty cycle' – how many pages a month the machine can handle.

Quoted printer speeds often refer to the speed the printer pushes a blank sheet of paper through the mechanism; for documents they refer to lower quality settings. PCW's tests use real documents and photos, giving a better idea of print speed.

For serious inkjet photo printing, consider higher-end models that use six, seven or eight colour cartridges.

Some 'convertible printers' use four separate black cartridges for longer-life mono printing and you can replace three of them with cyan, magenta and yellow cartridges for colour printing.

Laser models often have a large number of paper-handling options. They're usually modular so you can add features as required.

The quality and usability of the driver software is vital. Check PCW's reviews and online forums (**www.pcw.co.uk/forums**) and read the manufacturer's technical support site for any known problems.

TV TUNERS

1

Terratec Cinergy Hybrid T USB XS
£89 ★★★★☆
Reviewed June 06
http://en.terratec.net
A dual-format USB TV tuner complete with remote control and portable aerial.

2

Nebula DigiTV
£99.95 ★★★★★
Reviewed August 05
www.nebula-electronics.com
This external USB2 tuner has a built-in web server to let you share TV over your network.

3

Twinhan Magic Box
£69.99 ★★★★☆
Reviewed August 05
www.twinhan.com
A stylish external USB2 tuner with good software and an attractive price.

4

Terratec Cinergy 400 TV
£89.99 ★★★★☆
Reviewed March 05
http://en.terratec.net
A PC Card-based analogue tuner with good software, it's a great buy for laptop users.

5

Kworld Dual TV Tuner DVB-T 220
£49.99 ★★★☆☆
Reviewed October 06
www.kworld.com.tw
This device provides one analogue and one digital tuner at a decent price.

HOW TO BUY

Internal TV tuners require a PCI slot. External options connect via USB and are easier to set up. Hi-speed USB2 is often needed and devices typically require Windows ME, 2000 or XP.

A Freeview digital tuner offers the best channel choice, picture and sound, but may need an outdoor aerial (check **www.freeview.co.uk**).

Digital tuners record to disk for maximum quality; analogue signals need to be digitally encoded – look for mpeg2 hardware for real-time video and audio encoding.

Most analogue systems let you capture video from a VCR or camcorder. Look for composite or S-video connectors and stereo phono inputs.

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Pundit P1-PH1 Intel Socket 775 Barebone
Mft Code: P1-PH1
YOYO Code: 4098
£106.23 INC VAT

AM2 NVIDIA PCI-E SATA Barebone
Mft Code: mPC 51PV
YOYO Code: 80111
£180.25 INC VAT

19" TFT 2ms Monitor
Mft Code: VX922
YOYO Code: 2223
£222.83 INC VAT

19" DVI 8MS TFT Monitor
Mft Code: DML-519W100
YOYO Code: 4723
£140.81 INC VAT

Photosmart 7450 Q3409A Colour Printer
£42.56 INC VAT
YoYo Code: 80316

54Mbps Wireless ADSL Modem Router
Mft Code: DG834G
YOYO Code: 437
£62.33 INC VAT

54Mbps Wireless Adsl Router+PCMCIA Wireless Card
Mft Code: WGKPC354G
YOYO Code: 80209
£52.39 INC VAT

SB X-Fi Xtreme Music Soundcard
Mft Code: 70SB04600201
YOYO Code: 2066
£86.16 INC VAT

5.1 X530 Speakers
Mft Code: 970114-0120
YOYO Code: 9485
£47.55 INC VAT

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MONITORS

1 20IN

Sony MFM-HT205
£649 ★★★★☆
Reviewed June 06
www.sony.co.uk
An elegant widescreen multimedia monitor with superb image quality and a built-in TV tuner.

2

Belinea 10 20 30W
£319.99 ★★★★☆
Reviewed July 06
www.belinea.co.uk
A high-quality MVA panel with great specifications, but lacks a DVI port.

1 19IN

Hanns.G HW191
£150 ★★★★☆
Reviewed November 06
www.hannsg.com
A superb value-for-money monitor.

2

Iiyama Prolite E1900WS-B1
£175 ★★★★☆
Reviewed October 06
www.iiyama.co.uk
A budget monitor with decent brightness, contrast and response times.

1 17IN+

LG Flatron L1732P
£239 ★★★★☆
Reviewed February 06
www.lge.co.uk
Fast response times make this 17in panel a good choice for gamers.

HOW TO BUY

Monitor resolution is the number of picture elements (pixels) displayed on a screen. In any TFT or LCD monitor, each pixel is composed of three sub-pixels coloured red, green and blue. The number of pixels equals the 'native' resolution; a 1,024x768 TFT will have exactly that number of pixels horizontally and vertically. Users wanting 1,600x1,200 will probably need an expensive 20in model – most 19in panels are currently limited to 1,280x1,024.

Modern TFTs can be viewed from a wide range of angles vertically and horizontally, but anything over +/- 45° makes no difference in normal use. Response time is the time taken for a pixel to reach maximum brightness. Some newer monitors now have response times as low as 4ms, but 12-25ms is typical.

The ISO 13406-2 standard specifies minimum requirements for display contrast, viewing angle, brightness, reflections, flicker, contrast and defective pixels. ISO 13406-2 has stringent standards for defective pixels. Only Class I TFTs are guaranteed no defective pixels – most consumer models are Class II. Some manufacturers offer dead pixel guarantees with Class II TFTs – check the policy before you buy.

DIGITAL CAMERAS

1 DIGI SLR

Canon Eos 400D
£649 (body only) ★★★★☆
Reviewed December 2006
www.canon.co.uk
A quality digital SLR complete with a 10megapixel sensor and dust removal system.

1 PROSUMER

Fujifilm Finepix S9500 Zoom
£469.99 ★★★★☆
Reviewed February 06
www.fujifilm.co.uk
A serious contender to entry-level digital SLRs with a 10x zoom and 9megapixel CCD.

1 COMPACT

Canon Powershot A640
£329 ★★★★☆
Reviewed January 07
www.canon.co.uk
Outstanding image quality and a host of features make for an enticing camera.

2

Fujifilm Finepix Z3
£249.99 ★★★★☆
Reviewed December 2006
www.fujifilm.co.uk
A stylish digital compact, with excellent build quality.

3

Samsung NV10
£279 ★★★★☆
Reviewed December 2006
www.samsung.co.uk
A novel digital camera with some unusual features.

HOW TO BUY

In general, the higher the megapixel count of a digital camera's sensor – and the bigger the sensor's physical size – the more detailed the images. A small sensor and high megapixel count won't always produce better image quality. Four to five megapixels is good for 8x10in or larger prints. The quoted 'effective' pixels number is the camera's true megapixel resolution.

Forget digital zoom and concentrate on the optical zoom, which zooms in on the subject and produces a better-quality image. Digital zooms simply crop into the centre of the picture. Look at the selection of automatic or preset picture modes for standard shots, portraits, night shots and landscapes, plus macro modes for close-up photography.

Movie modes are not as good as a basic camcorder, but are fine for short movie clips to play on your PC. Most offer 15fps (frames per second), but some are 30fps, which means the video will be smoother. Experienced photographers will want manual controls for aperture and shutter priority, white balance and focusing. Good cameras should also provide quick and easy access to image quality, resolution and format settings.

ROUTERS

1 WIRELESS/MODEM

Netgear 108 ADSL router
£159 ★★★★☆
Reviewed April 05
www.netgear.co.uk
If you need a Super-G router with built-in ADSL modem, this offering from Netgear is great value.

2 WIRELESS/MODEM

Ozenda 11g ADSL Router
£70 ★★★★★
Reviewed November 04
www.ozenda.com
Ozenda has come up trumps – wireless ADSL doesn't get any easier than this.

1 WIRELESS

Linksys WAG54G (wireless)
£76 ★★★★★
Reviewed August 05
www.linksys.com
This 802.11g wireless model offers advanced features for home and professional users.

2

D-Link DSL-G624M
£110 ★★★★☆
Reviewed March 06
www.d-link.co.uk
Combines Mimo technology with Super G to give faster speeds and extended coverage.

1 VOIP

Intertex IX66+ ADSL Airsip GW (wireless VoIP)
£269.08 ★★★★★
Reviewed March 05
www.intertex.se
For a small business needing multi-user VoIP telephony, the Intertex IX66+ is hard to beat.

HOW TO BUY

The router is at the heart of any home network. Costing less than £100, they are an inexpensive way to exploit the advantages of being able to share information between the computing devices in your home. A router is a simple networking device to which you connect your PCs and notebooks using a network cable. They often include built-in firewalls and other security measures, making them ideal for protecting your PCs from intruders. The router connects to your broadband modem, as long as your modem uses an RJ45 Ethernet connection – most routers don't support USB modems. Special broadband routers, also called ADSL gateways, come with built-in ADSL modems. If your broadband is provided via a cable company's set-top box, you should buy a standard router without a built-in modem. Once hooked up, your devices can share broadband as well as swap data. Wireless (Wifi) routers are increasingly popular in the home market, allowing devices to remotely connect to the internet and each other without the need for cables – but wireless routers usually have network (Ethernet) ports to let you connect non-wireless devices.

PRODUCT INDEX

Below is a list of every product reviewed by PCW over the past three months, to help you find the full reviews quickly and easily in your back issues.

Key: ★ Editor's Choice ★ Recommended ★ Great Value All scores are out of five

	COMPANY	PRODUCT	ISSUE	SCORE
	2X	Application Server	Dec 06	2
★	3D Fuzion	Geforce 7600GS (graphics card)	Nov 06	4
	ACDSee	8 Photo Manager	Oct 06	4
	Acer	Acer Aspire 5652 (notebook)	Nov 06	4
★	Actinic	Actinic Business 8	Nov 06	4
	Adaptec	Snap Server 110	Dec 06	3
★	Adobe	Photoshop Elements 4.0	Oct 06	5
★	AIS	AIS DVB Viewer Pro 3.5.0	Nov 06	5
	Akasa	AK-HC-01-WH	Oct 06	4
	Akasa	Integral P2 E-Sata	Dec 06	4
	ALK	ALK Copilot Live 6 (navigation)	Nov 06	4
★	Altiris	Software Virtualisation	Dec 06	4
	Ambros	Shuttle SD36G5 PC System	Oct 06	4
★	Apple	iMac 24in	Dec 06	4
	Apple	iPod Shuffle	Dec 06	4
	Apple	Mac Mini	Dec 06	3
★	Apple	Nike + iPod Sport Kit	Nov 06	4
★	Ascaron	Darkstar One (game)	Nov 06	4
	Astaro	Security Gateway	Dec 06	2
★	Asus	F3F (£699 laptop)	Dec 06	5
★	Brother	Brother MFC-8860DN	Nov 06	4
	Buffalo	Linkstation Multimedia Server	Dec 06	3
★	Buffalo	Linkstation Pro	Nov 06	4
	Buffalo	Terastation Home Server	Dec 06	4
★	Canon	EOS 400D (Digital SLR)	Dec 06	4
	Check Point	Check Point VPN-1 UTM Edge	Nov 06	3
★	Chillblast	Fusion Hardcore Crossfire	Oct 06	5
	Chillblast	Hardcore 6600 PC	Nov 06	3
	Colour Confidence	Colorvision Printfix Pro	Oct 06	4
	Corel	Photo Album 6	Oct 06	4
	Cube	Pegasus ST6 (desktop PC)	Oct 06	4
	Dell	3007WFP (HDCP monitor)	Nov 06	4
	Dell	Powerconnect 3424	Dec 06	3
	Dell	XPS M2010 (notebook)	Nov 06	4
	Diskeeper	10 Professional Premier Edition	Oct 06	4
	EMC	Retrospect 7.5 (backup)	Oct 06	4
	Empire Interactive	Wings over Europe	Dec 06	2
★	Enermax	Enermax Aurora (peripheral)	Nov 06	5
	Enermax	Galaxy (power supply)	Dec 06	4
	Enermax	Vanguard (removable storage)	Oct 06	4
	Enermax	Warp PC case fans (component)	Oct 06	3
★	Evesham	Solar Plus (Conroe PC)	Nov 06	4
	Evesham	Quest A430 (£699 laptop)	Dec 06	3
★	Evesham	Visto (desktop PC)	Oct 06	5
★	Evesham	Voyager C720DC (notebook)	Nov 06	4
	Extrasys	Hosted Desktop (applications)	Oct 06	3
	Firefly Studios	Civcity Rome (game)	Nov 06	3
★	Flock	Flock (web browser)	Oct 06	4
	Focus HI	Call of Juarez (game)	Nov 06	3
	Freecom	Storage Gateway WLAN	Dec 06	4
★	FSP	FSP Booster X3 (component)	Nov 06	4
★	Fujifilm	Finepix F30 (digital camera)	Nov 06	4
	Fujifilm	Z3 (Digital Camera)	Dec 06	4
	Gigabyte	GA-965P-DQ6 (motherboard)	Oct 06	4
★	Google	Picasa 2 (photo software)	Oct 06	4
	Gordano	Messaging Suite v12 (email)	Oct 06	3
★	Hanns.G	HW191 (TFT monitor)	Nov 06	4
	Hannspree	Hannsvaas (TFT monitor)	Oct 06	3
	Hi-Grade	A9700 (£699 laptop)	Dec 06	3
	HP	Pavilion Media Centre TV m7475	Oct 06	4
	Hyundai	N91W (19in TFT)	Dec 06	4
	Iiyama	Prolite E1900WS-B1 (monitor)	Oct 06	4
	Intervideo	DVD Copy 5 Platinum	Dec 06	3
★	Iomega	Storcenter Network Hard Drive	Dec 06	4
	Ipswitch	WS_FTP Professional 2007	Nov 06	4
	KWorld	Dual TV Tuner DVB-T 220 (tuner)	Oct 06	3
★	La Cie	Ethernet Disk Mini	Dec 06	4
★	Lego	Star Wars II (3D Action)	Dec 06	4
	Lexmark	X3480 (multifunction device)	Oct 06	3
	Linksys	EFG120 (network storage)	Dec 06	3
★	Logitech	Revolution (laser mouse)	Dec 06	5
	Magnetictime	Magnetictime (utility)	Oct 06	3
★	Matrox	Triple Head 2Go (adapter)	Oct 06	4
	Maxfield	G-Flash Metal (media player)	Oct 06	2
	Maxtor	Shared Storage II	Dec 06	4
★	McAfee	Total Protection 2007	Dec 06	4
★	Mediaman	Multimedia Player HVX-3500	Oct 06	4
	Mesh	Elite E6600 PCW (Conroe PC)	Nov 06	3
	Mesh	Matrix2 AM2 5000 PCW (PC)	Oct 06	4
	Mesh	Elite Fire X1950 PCW (PC)	Dec 06	4
	Mesh	Matrix Quad FX (PC)	Nov 06	4
	Microsoft	Digital Image Suite 2006	Oct 06	3
	Microsoft	Windows Vista RC1	Dec 06	N/A
	Midway	Rise and Fall: Civ. at War	Oct 06	2
	Minispeakers	K8000 (speakers)	Oct 06	4
	Mio	C210 (satellite navigation)	Oct 06	2
	Mio	C710 (satellite navigation)	Nov 06	5
	Mogo	Mouse (travel mouse)	Dec 06	3
	MSI	Megabook M662	Dec 06	3
★	MV	Moebius 13" (£699 laptop)	Dec 06	4
	NEC	TCM160 (notebook computer)	Oct 06	3
★	Netgear	Powerline XE104 (switch)	Nov 06	4
	Novell	Novell Suse Linux Enterprise 10	Nov 06	4
	Nuance	Dragon Naturally Speaking 9	Nov 06	4
★	Opera	Opera 9 (web browser)	Oct 06	4
	Orlogix	Automagic CD-R	Dec 06	3
	Panasonic	Panasonic Toughbook CF-74	Nov 06	3
	PC Nextday	Zoostorm 5-7402 Edge PC	Nov 06	4
★	PC Nextday	Zoostorm 5-7502 Advanced PC	Oct 06	5
★	Philips	SLM5500	Dec 06	4
★	Phoenix	Recover Pro 6	Dec 06	4
	Pillar Solutions	Winternals Recovery Mgr. 3.0	Oct 06	4
	Pinnacle	Mobile Media Converter	Nov 06	3
	Plextor	PX-EH25L (network storage)	Dec 06	2
	Pocket	Mindmap	Dec 06	4
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	Ridings	Ridings Slimplug (accessory)	Nov 06	3
★	Sage	Start-Up	Dec 06	4
	Samsung	NV10 (digital camera)	Dec 06	4
	Samsung	SM205BW (HDCP monitor)	Nov 06	4
★	Samsung	SM215TW (HDCP monitor)	Nov 06	5
★	Sage	Start-up	Dec 06	4
	Samsung	Syncmaster 940NW (TFT)	Oct 06	4
★	Sanyo	Xacti VPC-C6E (camcorder)	Oct 06	4
	Scan	3XS C2D-OC (Conroe PC)	Nov 06	5
	Serif	Album Plus 4 (photo software)	Oct 06	3
	Sharp	XV-Z3000 (projector)	Nov 06	4
	Shuttle	Mini X 100HA (small PC)	Nov 06	2
	Sky	Sky+ Remote Control	Oct 06	4
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	Smoothwall	Corporate Guardian 5	Nov 06	3
	Sonic Gear	i-Steroid (speakers)	Oct 06	4
	Sony	MFM-HT205 (HDCP monitor)	Nov 06	5
	Sony	PCS-TL30 (video-conferencing)	Nov 06	3
	Sony	Vaio TX3HP (notebook)	Oct 06	4
★	Storcase	Data Express for Backup	Oct 06	5
★	THQ	Titan Quest (game)	Oct 06	4
	Tom Tom	Go 510 (satellite navigation)	Oct 06	4
	Toshiba	Satellite A110-275 (£699 laptop)	Dec 06	4
	Ubisoft	Pirates of the Caribbean: Legend of Jack Sparrow (game)	Oct 06	3
	Ubuntu	6.06 LTS (Linux distribution)	Oct 06	4
	Viewsonic	VG2021m (TFT monitor)	Nov 06	4
	Viewsonic	VP2330wb (HDCP monitor)	Nov 06	4
	VMware	Infrastructure 3	Dec 06	3
	Western Digital	Netcenter 500	Dec 06	3
★	Wired2Fire	Pyro 64 FX (desktop computer)	Oct 06	4
	Zalman	CNPS8000 (CPU cooler)	Dec 06	4
	Zalman	VF-900-CU (VGA cooler)	Dec 06	4

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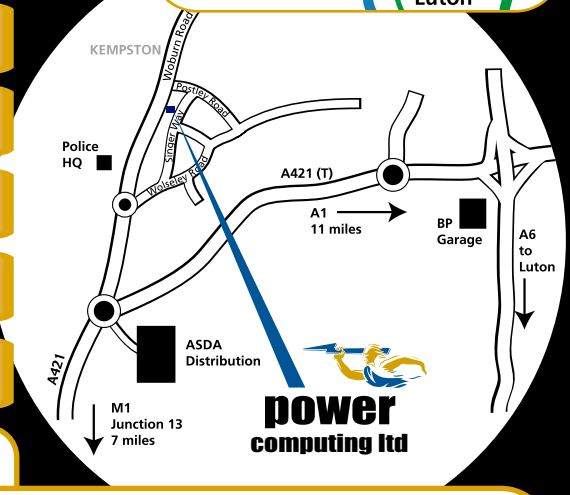

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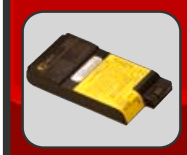

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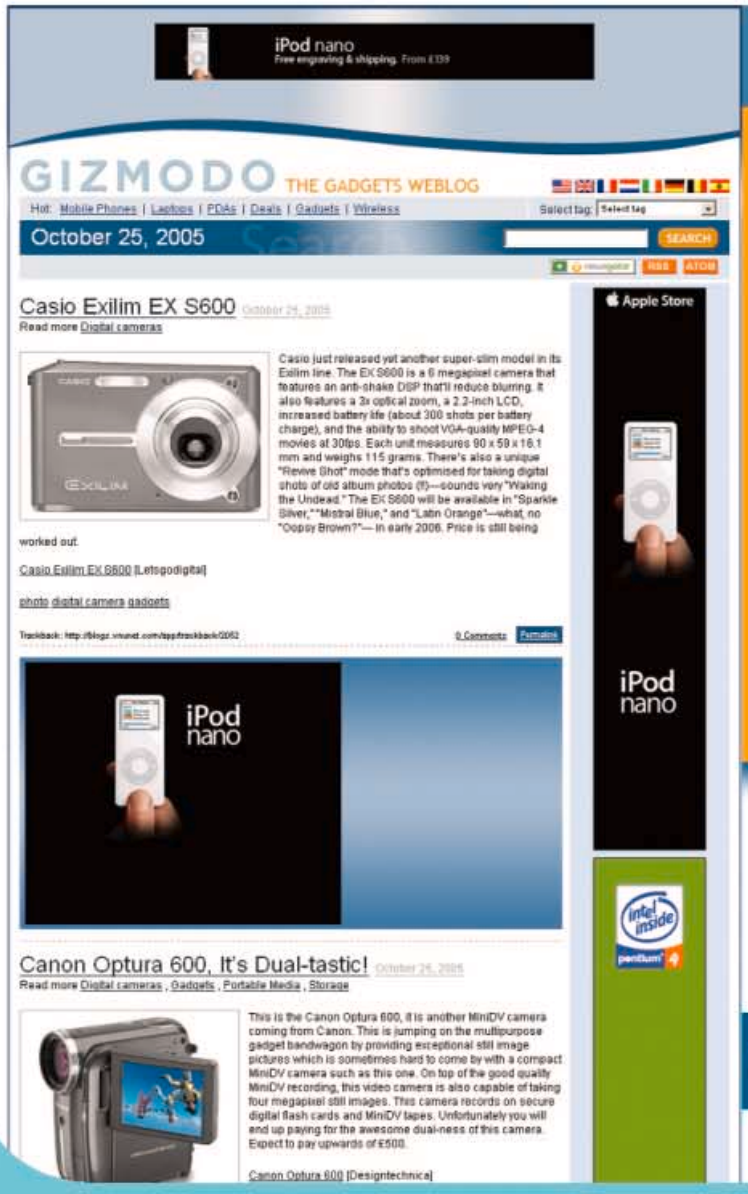

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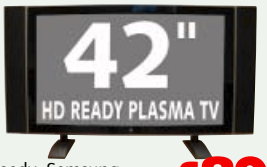

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Developers
Internet
Media
Security
Utilities

GAME DEMOS

Age of Empires III the Warchiefs
Bionicle Heroes
Championship Manager 2007

USING THE COVER DISC

The PCW cover disc uses a web-browser-style interface. To get full functionality, you'll need to use Microsoft Internet Explorer (version 5.5 or later). Unfortunately, Netscape doesn't properly support this software. However, we have also provided links to the featured programs so you can still copy them to your hard disk or install them manually (the standard download dialogue box will appear). Programs can be found in the \software\folder on the disc.

STARTING THE DISC

The CD-Rom (or DVD) should auto-start. If it doesn't, double-click the CD-Rom/DVD icon in My Computer or open the terms.htm file on the root of the disc.

PROBLEMS?

Please note that we cannot give support on individual programs contained on this disc. If you have problems running the disc or any of its content, please note these guidelines:

FAULTY DISC

If the disc is physically damaged and will not load, return it to this address for a replacement: PCW January 2007, cover disc ABT, First floor, 13 Clifftown Road, Southend on Sea, Essex, SS1 1AB quoting reference: 'PCW Vol 30 No 1'.

PROBLEMS INSTALLING/ RUNNING THE SOFTWARE

Check the support page on the disc or check the manufacturer's site.

GENERAL DIFFICULTIES

Call 08700 885 995 (9.30am to 5pm Mon, Tues, Thurs & Fri; open until 8pm on Wed and 10am to 2pm Sat).
Or go to www.vnusupport.co.uk or email us at pcw@vnusupport.co.uk.

For software requiring registration, PCW cannot guarantee that serial codes will be available later than three months from the on-sale date of the magazine. Please avoid disappointment by registering your software promptly.

SIX PAGES OF DISC INFO INCLUDING

- PRODUCT DESCRIPTIONS
- WORKSHOPS
- UPGRADE OFFERS
- KEY FEATURES
- CONTACT DETAILS
- NEED TO KNOW

McAfee Quickclean 2005

FULL VERSION

When your new PC arrived it was efficient, with Windows and any bundled applications using the minimum amount of hard drive space. But then you had to go and use it, didn't you? And before long your drive was clogged with forgotten temporary files and leftover remnants of programs you thought you'd uninstalled. This is why you need to install Quickclean, which detects and deletes the junk, freeing up your hard drive and restoring your PC to peak performance.

You could choose to 'Quickly clean my computer', in which case Quickclean will find files you can safely delete in the Recycle Bin, your Temporary Files folder, Internet history, cookies and cache files, and more. If files are confidential, you can erase them using the McAfee Shredder, which overwrites them multiple times so there's no possibility of the files being undeleted.

You can also opt to check your PC manually using the McAfee Folder Browser. This uses an Explorer-type window, but the space taken by each folder is displayed right next to its name so you can see what's hogging your hard drive.

Quickclean also includes a powerful automatic browser cleaning feature, deleting your choice of cache, history or cookies when the browser is closed. The Application Remnant Cleaner helps to discover files and Registry keys left behind when a program is uninstalled. Give it a try and see how much space Quickclean can recover on your hard drive.

Quickclean offers various PC-cleaning options

INFORMATION

System requirements Windows 98/MD/2000/XP, 35MB free hard disk space
Contact www.mcafee.com/uk
Registration Follow the instructions during installation

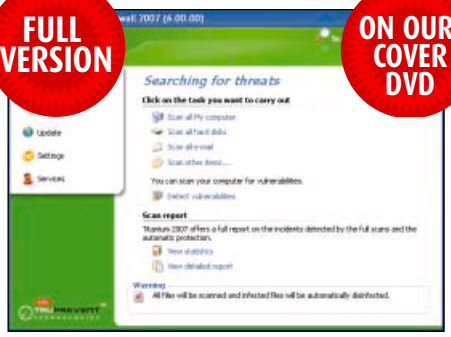
UPGRADE OFFER
SAVE MONEY ON OTHER MCAFEE PRODUCTS

If you like Quickclean, then take a look at the special deals McAfee is offering on its other products. These include McAfee Internet Security for £39.99 (save £10); McAfee Home Network Security for £39.99; McAfee Virusscan Home Edition for £29.99 (save £10); McAfee Virusscan Professional (three-user) for £79.99; McAfee Personal Firewall for £29.99 (save £10); McAfee Antispyware for £24.99; and McAfee Spamkiller for £24.99. Purchase online at **www.mediashak.com** or call Mediashak on 01788 574 000 (between 10am and 5.30pm).

Panda Antivirus + Firewall 2007

FULL VERSION

ON OUR COVER DVD



Detect malware, block hackers and keep your PC safe online.There's been a lack of headline-grabbing virus outbreaks recently, but don't let that fool you. There are more online dangers than ever before but they're more targeted, intelligent and harder to detect. Unless, that is, you install Panda Antivirus + Firewall 2007, which includes everything you need to keep your PC safe online.

The anti-virus module grabs daily signature updates to ensure it knows about all the latest threats, then scans your local hard drive, CDs and DVDs, email, file downloads and instant messaging traffic to look for incoming threats.

Of course, this also leaves you theoretically vulnerable to attacks from new malware, at least until the signature database is updated, so Antivirus + Firewall 2007 also provides Panda's Truprevent Technologies to fill the gap. This looks at the code of programs and monitors them for suspicious behaviour.

Spyware detection, blocking and removal is thrown in for free, and the program is always looking for malware that tries to change your Internet Explorer settings. You'll be warned if this happens and a copy of the original settings is always available to restore, undoing any damage.

Panda's firewall keeps intruders out of your PC and stops spyware calling home. It gives you reliable protection without the constant, irritating warnings of other competitors.

Get virus scanning, spyware blocking, phishing protection and an excellent firewall in one, easy-to-use package

INFORMATION

System requirements 256MB Ram, Windows 98/ME/2000 Pro/XP, 160MB free hard disk space
Contact www.pandasoftware.co.uk
Registration Follow the instructions during installation, or click Services and follow the link at the bottom of the screen
Limitations Three months of free updates

UPGRADE OFFER
SAVE 15% ON AN ANTIVIRUS + FIREWALL LICENCE

Our copy of Panda Antivirus + Firewall 2007 aims to keep your data safe and your PC malware-free for three months, but if you want to continue to use the program after that you'll need to renew its licence. As a PCW reader you'll get a whole year of extra protection for only £22.94, saving 15 per cent on the usual £26.99 price. Or you can upgrade to Panda's comprehensive Internet Security 2007 for only £36.54, again saving 15 per cent on the list price of £42.99. Visit **www.pandasoftware.co.uk** when you're ready to buy.

Ashampoo Burning Studio 2007

Burn audio or data discs quickly and easily, with maximum quality

INFORMATION

System requirements Windows 98/ME/2000/XP, 20MB disk space
Contact www.ashampoo.com
Registration Check the 'Get full version key' box during installation, or click Internet > Register from within the application

It should be simple. After all, you only want to back up some data to DVD, then create a music CD. And yet the average mastering package makes this far trickier than it needs to be.

Ashampoo Burning Studio takes a different approach to CD and DVD burning. It doesn't fill your hard drive with label creators or Wav file editors. There's no complicated interface to navigate, or weird technical options you'll never use. Instead, the program concentrates on the core mastering tasks and on ensuring that you'll get them completed in the minimum of clicks.

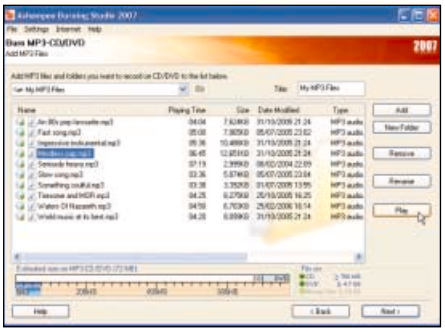
If you're backing up data, for example, just click Burn Files and Folders > Create a New Disc, then drag and drop your files onto program and click Next > Write CD. Creating an audio CD is just as easy – three or four clicks, some drag and drops and the job is done. It uses the same interface as the backup screen, too, so use one and you'll be instantly familiar with the other.

Explore the program further and you'll find further options to create mp3 or Wma CDs, rip audio CDs, work with disc images, erase rewritable discs and more. Don't think the straightforward interface means you're being short-changed on features, either. The program supports plenty of music formats when you're creating an audio CD (Ogg, Wav, mp3, Wma, Flac), for example.

The Disc Image functions support ISO, Cue/Bin and Ashdisc files. And the program works with Blu-ray discs as well as CDs and DVDs, so it could be your mastering tool of choice for years to come.

Build a quality Mp3 CD in three quick and easy steps

1 There's no mass of complicated toolbars to navigate in Burning Studio 2007, just a very simple, task-based interface. Choose the type of function you want to perform from the task menu and let the program tell you what happens next: in this case, you should click Burn or Rip Music > Create an mp3 disc.



2 You can now drag and drop the mp3 files you'd like to use onto the playlist area, or click Add and point Burning Studio 2007 at them manually. The bar at the bottom of the screen lets you know how much space you've got left, and there are buttons on the left to remove, rename or play the currently selected file.

3 Click Next when you're happy to see the 'Burn MP3-CD' screen, and place a blank CD or DVD into your drive. You'll see a disc icon with a green tick once it's been recognised with the program. Click Change Options to change settings like Write speed or Number of copies, then click Write CD to burn the finished disc.

UPGRADE OFFER TO ASHAMPOO BURNING STUDIO 6

NEW FEATURES

Multi-disc backup and restore
Compress and password-protect
Burn DVD Video, SVCD, VCD discs
Verify discs immediately after burning
Interactive troubleshooting assistance
Interface improvements and tweaks

This application takes the core features of Burning Studio 2007 and adds a complete backup function, with the ability to save data to multiple CDs, DVDs or Blu-ray discs. Backup archives may be compressed and password-protected, then restored later to their original discs. You can now burn video DVDs in a variety of formats, verify discs without ejecting them first (if the drive supports it) and more. And you can get all this for only £7.49. That's 50 per cent off the usual £14.99 price. Click Internet > Upgrade to Ashampoo Burning Studio 6 for more information.

Genie Backup Manager 5 Home

Protect your system from data disasters with this flexible tool

It's a fundamental law of computing that backups will always be a hassle. Genie understands this, which is why Backup Manager 5 is optimised to get the whole tedious business over as quickly as possible.

There's no chance of getting lost when you start the program: just click the big Backup button in the middle of the screen. The process of creating a backup is then broken down into simple steps such as 'Where to back up' and 'What to back up', so it's obvious how to proceed.

As you explore each screen you'll find a surprising number of options. Your backup destinations can be local or network drives, multiple disks, CDs or DVDs and even remote FTP servers. Thoughtful configuration options include the ability to limit FTP backup speed to a specified number of Kbytes/sec, so the program needn't hog your internet connection.

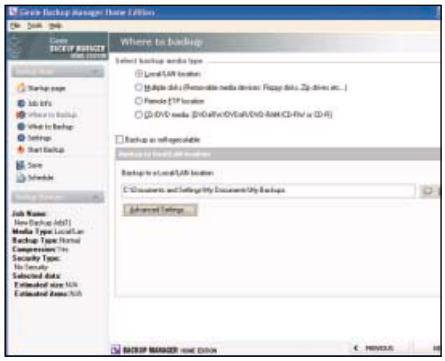
And when it comes to choosing exactly what you're backing up, Genie Backup Manager is just as impressive. It already understands how to back up a host of applications, along with tools such as Outlook and Outlook Express, the Registry, Windows settings, browser favourites and more. Saving any of these is as simple as checking a box.

You also get a choice of normal, incremental or mirror backups; the archives may be compressed to reduce space requirements; and you can password-protect them, with 128-bit AES encryption. Add a powerful scheduler and this makes an impressive backup tool, and will be invaluable in protecting your crucial files from potential disaster.

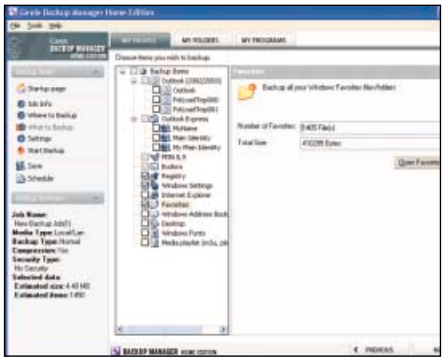
INFORMATION

System requirements 128MB Ram, Windows 98SE/ME/2000/XP,20MB disk space, IE 5 or later
Contact www.genie-soft.com
Registration Point your web browser at **www.genie-soft.com/magazines/vnu.aspx**

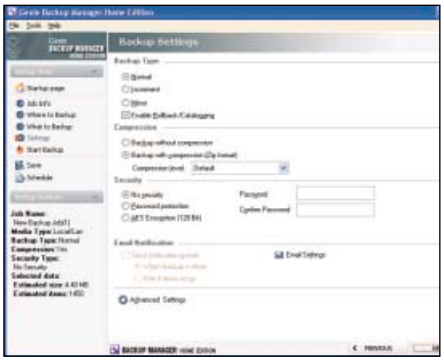
The 60-second backup plan



1 Backups don't have to take a long time. Just spending a few seconds saving some key files could save you time later. Launch Genie Backup Manager and click Backup > Next, then choose where you want your files to be saved: a local or network drive, CD or DVD, and so on. Click Next.



2 The My Profile tab provides an easy way to back up important files. You can do this simply by clicking on a check box. Check Registry, Windows Settings and Favourites, for example, then add others if you like. Click My Folders if you want to specify other files or folders to save, then click Next.



3 Complete the process by deciding what type of backup you'd like (Normal, Incremental, Mirror), the level of compression you need and whether the backups should be encrypted and password-protected. Then click Next > Backup Now and your valuable files and settings will be saved for posterity.

UPGRADE OFFER

GET GENIE BACKUP MANAGER PRO 7.0

NEW FEATURES

Integrated online backup service
More app and settings supported
Dual-Layer DVD support
128/192/256-bit AES encryption
Powerful scripting language
Email notification of backups

The very latest version of Backup Manager Pro now includes an integrated online backup service – free space that you can use for remote backup of your most important files. Enhanced encryption of up to 256 bits ensures your data will stay private. More applications and Windows settings can be backed up with a single click, and support for dual-layer DVDs means less disc swapping. The price for all these extras is only £26, and you can place your order at **https://www.regsoft.net/regsoft/vieworderpage.php3?productid=77646&pc=XG728**.

Orgplus 6 Express Small Business

It's the easiest way to create colourful, informative charts

INFORMATION

System requirements 256MB Ram, Windows 98SE/2000/XP, 80MB free hard disk space, 1,024x768 resolution display

Contact www.orgplus.co.uk

Registration Launch the program and click Register Now on the opening screen

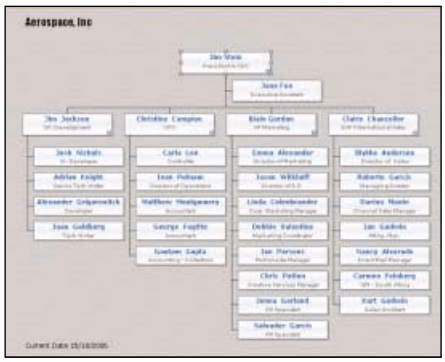
Organisational Charts are a clear and convenient way to illustrate any hierarchy, and it's not difficult to produce them yourself. But is that wise? If you're creating this chart for a crucial business report, you don't want it to look like something you threw together in five minutes. Much better to impressive your boss with a classy, stylish chart from a specialist charting tool like Orgplus 6. This still might take you only five minutes to create, but at least now it won't look that way.

Click File > New in Orgplus to begin, and choose a template from the selection of 30 or more on offer. A small chart will appear, and maybe it'll be enough for whatever you want to do. If this is the case you can click in each individual box and start typing to enter a name and company position. Select any boxes left over, press Delete to remove them, and the chart is done.

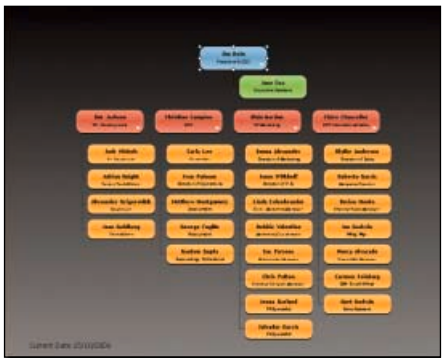
Extending the template chart is just as easy, and there's no need for you to draw boxes manually or add lines to join everything together. Just choose the type of box you'd like to add from the toolbar (Manager is a box above, Subordinate a box below, Peer a box on the same level), then click the box where the new box is to be added for Orgplus to add it.

You can customise the look of your chart further, if you like, by experimenting with various chart styles and properties (explore the Format menu for more). And when you've finished, save the results as an image or HTML file, ready to put online and share with others.

Liven up your organisational charts with a little help from Orgplus



1 **Orgplus says this chart conforms to the 'basic' template. It has a point, although the chart does manage to include some nice visual touches: drop-shadows on the boxes and a gentle gradient fill behind the text, for example. Still, if you need a more striking look then it's easy to try something else.**



2 **Click View > Templates, for instance, then double-click on a template of your choice to choose a more dramatic colour scheme and perhaps change text and box styles. Don't like it? Click Edit > Undo and you'll go back to the previous style, or double-click on another template until you find one that appeals.**

3 **Don't forget that Orgplus charts can hold images, too, which always adds a little extra visual appeal, and these can also be customised with a few template tweaks. Click File > Open and try out some sample Orgplus charts to see how this works, and just how impressive the finished results can be.**

UPGRADE OFFER

DISCOVER ORGPLUS 6.0 PROFESSIONAL

NEW FEATURES

Create charts from data sources
Scheduled data-synchronisation
Publish to Word/Pdf formats
Create Powerpoint presentations
Scheduled publishing
Automatic email distribution

Try out the professional version of Orgplus and you'll be able to create charts directly from many data sources: ODBC, Oracle, Peoplesoft, SAP, Ldap, TXT, Active Directory, XLS and XML. You can also synchronise charts directly with a data source, publish your chart in Word doc or Adobe Pdf formats, create Powerpoint presentations and much more. Prices start at £195, with discounts if you buy five or more copies. Visit **www.orgplus.co.uk** for more information.

Actinic Catalog 8 LE

Design, build and manage your own online store

INFORMATION

System requirements 256MB Ram, Windows 2000/XP, 120MB free disk space, Internet Explorer 6 or later

Contact www.actinic.co.uk

Registration Not required

Need to know Your store is limited to a maximum of 25 products

Setting up your first web store can seem an intimidating task. So much so that you could be tempted to do some shopping of your own – a copy of Dreamweaver, a course on SQL and databases, a manual on PHP scripting.

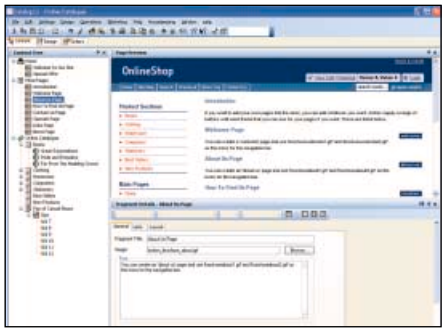
Or you could install Actinic Catalog 8 LE and let it do the hard work for you. There's no need to worry about site design, because the program comes with moe than 40 themes, ready to use with a couple of clicks. Each theme can be customised with your choice of more than 50 colour schemes, and you can tweak individual elements to give the site a unique look.

There's plenty of control and flexibility over how products are displayed on your site. Actinic allows you to enter details such as the product name, price, description, a thumbnail and a ful-sized image and the minimum and maximum quantities a visitor can order.

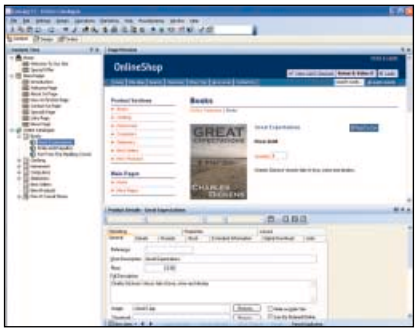
This version of Actinic lets you add a maximum of 25 products to your store, but that's not as restrictive as you might think. Individual products can have many variations, so for example a T-shirt can be sold in black, white, red or blue and still count as one product.

The program also walks you through creating other key details, such as how to handle discounts, taxes and shipping. The built-in shopping cart allows visitors to choose the products they want, check the price and place an order, which you can pick up through the Actinic interface. With the bundled store management and marketing tools, there's everything you need to run an effective online business.

Take on Amazon with your own customer-friendly online store



1 Actinic Catalog represents your site in a 'Content tree' on the left-hand side of the page, and working through this will help you build the store. Initially this is all about entering information for pages such as About us, How to find us, Contact us and more, which is as easy as typing text in a box (although you can usually add HTML, if you like).



2 Next you can add sections to the shop for particular types of product such as books, CDs or DVDs. Then add products to each section (maximum of 25 for the whole store in this version). The tabbed Product details dialogue lets you specify everything from the name, price and a product image, to whether or not Actinic will monitor stock levels of the product as it's ordered.

3 When it's all finished, Actinic will publish the site to your own web space (as long as it can run Perl, you'll be OK), or you can use Actinic Software's trial servers for free just to see how it looks online. A working shopping cart, site search, order totalling, discount handling – everything you need is here already. Just add great products and wait for the orders to roll in.

UPGRADE OFFER

ADD ACTINIC CATALOG OR BUSINESS

NEW FEATURES

Support up to 20,000 products
Apply discounts on quantity bought
Import from Sage Line 50/Quickbooks
Complete orders via barcode scanning
Create 'Also bought' lists
Advanced mailing list generation

If the 25-product limit on Catalog 8 LE proves to be a problem, you could always upgrade to the Catalog 8. It can handle up to 20,000 products, which should be enough for just about everybody. Meanwhile Actinic Business adds more corporate functionality, such as the ability to interface with Sage Line 50 and Quickbooks to transfer orders and import product and customer data. The upgrade to Catalog costs £299 ex Vat (save £80), or £699 if you're moving to Business (save £100), and you can read more about both programs at **www.actinic.co.uk**.

COMPETITION

WIN! Five D-Link Wireless Internet Cameras

For many businesses security cameras provide an excellent way of monitoring events in real time, and play a critical role in crime prevention. For home users, cameras can be used in many other ways in and around the home to provide reassurance and peace of mind. To bring this technology to a greater number of people, end-to-end networking solutions provider for the business and consumer markets D-Link has developed the Securicam DCS-2120 Wireless Internet Camera. And *PCW* has five of these cameras – worth £211 each – to give away.

Developed for home or small office use, the DCS-2120 lets you remotely view live video and listen to sound from a 3G mobile phone or PDA in real time from anywhere within a mobile's 3G service area. Together with CPU and web server, the DCS-2120 camera features a low-light-sensitive lens – ideal for night-time use – and a powerful 4x digital zoom capability. The camera comes with free surveillance management software that can control up to 16 cameras viewable from a single computer screen.

The built-in web-based interface allows for ease of use and control. For effective and flexible surveillance in and around a building, the camera has a built-in 802.11.g wireless network interface and includes a 10/100Base-TX Ethernet port for convenient connection to an Ethernet network, or broadband internet via a gateway router. The DCS-2120 supports resolutions up to 640x480 at up to 30 frames per second.

The camera adheres to the Universal Plug-n-Play specification, which allows computers running Windows XP/ME to automatically recognise the camera and add it to the network, making it easy to install and integrate in any network.

For more information on the D-Link Securicam DCS-2120 Wireless Internet Camera, visit **www.dlink.co.uk**.

For your chance to win, answer the following question and enter at **www.pcw.co.uk/competitions**. The competition opens on 10 November and closes on 6 December 2006.

How many cameras does the free software enable you to control from a single computer screen?
a) 8
b) 14
c) 16

View live video and listen to sound remotely in real time with D-Link's DCS-2120

This competition is open to readers of *PCW*, except for employees (and their families) of VNU Business Publications, and D-Link. PCW is the sole judge of the competition and the Editor's choice is final. Offer applies to residents of the UK and the Irish Republic only. Entrants must be over the age of 18 and only one entry per household will be accepted. Winners will be selected at random from all correct entries received. No cash alternative is available in lieu of prizes. VNU will use all reasonable endeavours to notify the winner(s) within 14 days of the close of the competition. VNU reserves the right to substitute the prize for one of greater or equal value if circumstances make this unavoidable. Prizes will be dispatched by the competition sponsor(s) and the winner(s) name(s) and address(es) will be provided to the competition sponsor(s) for this purpose. No purchase of the magazine is necessary to enter the competition. VNU will use all reasonable efforts to ensure that the prizes are as described on this page. However, VNU cannot accept any liability in respect of any prize, and any queries regarding a prize should be taken up directly with the sponsor of that prize.

The winner of the November competition is Christine Jones, who wins a football-themed Shuttle XPC G 2100B PC.

ENTER ONLINE AT www.pcw.co.uk/competitions

On the web

www.pcw.co.uk

PCW is not just a great monthly magazine, we also have a website carrying daily news, reviews, features, downloads, competitions and blogs written by us and our sister VNU titles. The website is updated daily, to help keep you abreast of the latest events and new products.

The Test Bed

Our labs blog, the Test Bed, gives you regular updates on the latest gossip, technology trends and products. We also have a performance area, where test results can be compared so you can see how well rival products fare against each other. Our database of products makes it the most comprehensive tool you will find and the perfect complement to our Buyer's Guides and reviews.

→ **http://labs.pcw.co.uk** → **http://www.reportlabs.com/testbed**

PCW Interactive

You may recognise some entries in this blog from our Letters pages, but they are published here first, letting you add your views and comments.

→ **http://interactive.pcw.co.uk**

PCW Newsletters

If you want to keep up with the latest news, reviews, blogs, Hands on and software downloads then sign up for our weekly *PCW* email newsletter. It is published every Friday and gives you a selection of the highlights from the week. Our Products newsletter goes out on Wednesdays and includes the most important news stories and reviews.

→ **https://www.vnuservices.co.uk/pcw**

PCW podcasts

We record a weekly podcast looking at our favourite products reviewed that week. Going live every Friday, it often also includes exclusive web competitions in which you can win the featured products.

→ **http://www.pcw.co.uk/podcasts**

PCW tests and reviews

Our tests and reviews are independent, with no outside influence from manufacturers. Vendors are not allowed to see the results of our tests before publication, ensuring you can completely trust the independence of what you read.

Prices: All prices include VAT unless otherwise stated.

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Personal Computer World

NEXT MONTH

ON SALE 5 DECEMBER 2006

Fix your Microsoft headaches

Despite lots of upgrades, patches and service packs over the years, there are still dozens of 'features' in Microsoft Windows and Office that can be incredibly annoying. We've got just the toolkit you need to cure them for good.

Bargain-basement PCs

Not long ago, £500 for a PC would have been almost a car-boot sale price. These days it's a common price tag for brand new models and, as our group test proves, you'll be surprised at just how much value you get at the lower end of the PC food chain.

Draft-n Wifi routers

It seems like nobody can be bothered to wait for standards to be ratified these days. Draft-n is the latest non-standard for high-speed Wifi, promising speeds comparable to a wired network. We've tested six of the latest models to see whether they're worth upgrading to.

The internet: Past, present and future

It's been 15 years since the magic three letters 'www' first appeared. PCW has been here for all that time (and much more!) so we're celebrating the web's birthday with a look at how (and why) it all came about and where Internet technology's heading.

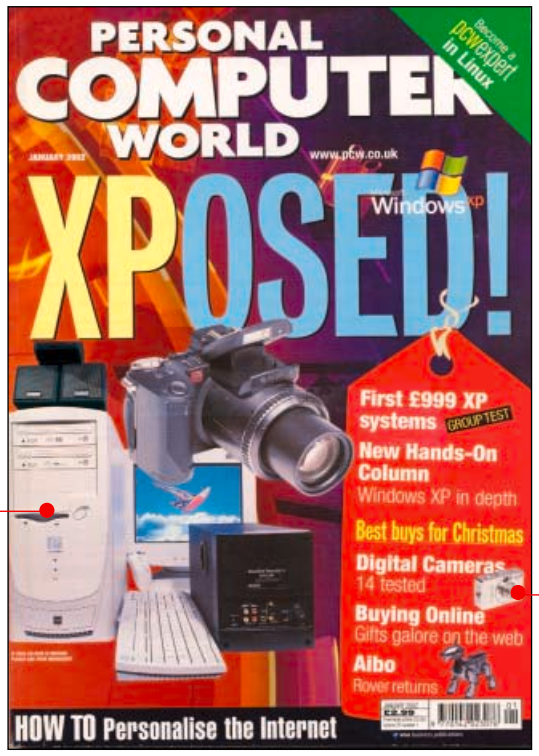
There's lots more in February's PCW
DON'T MISS IT...

JANUARY 2002

From the archives: Take a look at the important events in technology five, 15 and 25 years ago.

Our group test focused on PCs running Microsoft's latest operating system. XP had arrived just in time for Christmas and the shopping bonanza was well under way. AMD, which had introduced its Athlon 'XP' CPUs to coincide with Windows XP's launch, stole Intel's thunder by powering nine of the 10 machines.

Our favourite PC was the Systemax A1700JW. Its Athlon XP 1700+ and 256MB of Ram was typical of the group but its scanner, printer and webcam set it apart.



The megapixel wars were well under way and we looked at 14 digital cameras. The winner was the 4.1-megapixel Olympus C4040 Zoom. The image quality was crisp and clean and the 3x zoom plentiful. Our conclusion was: "At just over £700 this is one of the best-value cameras on test."

We also said Compact Flash (CF) and Smartmedia had a price and availability edge over Secure Digital (SD) cards. How times change – just try finding Smartmedia cards these days.

A small news article revealed how Apple had just released "yet another mp3 player". Our news editor Clive Akass suggested this device, called the iPod, "looks like being a toy only for wealthier users". It came with iTunes version 2.0, which was limited to Macs.

JANUARY 1992

We proudly plastered 'Giant SX test' on the cover of this issue. It was one of the biggest group tests in *PCW*'s history. With the 286 glory days gone, 45 386SX/20s were put through their paces.

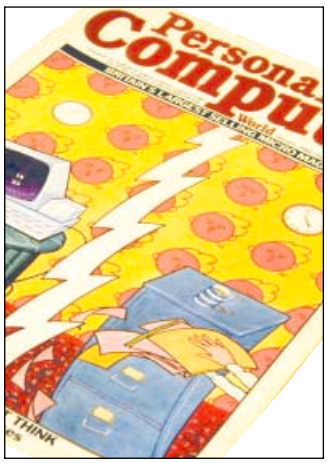
Two systems managed to stand out as the worst in the round-up: MBC and Strand could not even achieve average performance. The HM Minstral Workstation and the Compuadd 320SC were close contenders, however the £1,549 Tandon MCS 386 SX/20 won the test for being well designed, well built and speedy.

Meanwhile winners of the *PCW* awards for 1991 were published. The hardware winners included the Apple Macintosh Classic and the Sega Megadrive. On the software front, Word for Windows 2.0 and Excel 3.0 won awards, while Best Entertainment Product went to the timeless and addictive Lemmings.

In our feature on computer-aided design we explained how Autocad was improving racing car design where up to 60 per cent of components had to be changed every year.

JANUARY 1982

In the early 1980s two giant corporations entered the microcomputer market: Xerox and the BBC. We tested systems from both, starting with the Xerox 820 micro. It was a very competent, no-frills system but we were disappointed that virtually no software was included. The electronic components were housed within a plastic monitor cabinet, with a 12in black and white screen. A 2.5MHz processor with 64KB of Ram powered the system. Impressively, the unit could hold up to four disk drives.



The BBC Micro was an all-in-one computer with 16KB of user memory and 32KB of permanent software and one of the most powerful graphics systems on a special chip. *PCW*'s Chris Sadler and Sue Eisenbach predicted that it had great potential and would provide many newcomers with a first glimpse of the computing world.

The Air Call radio paging system was launched for high-fliers who spent a lot of time on the road. After plugging the receiver into a cigarette lighter, you could keep in touch with anyone in the country.

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